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CENTRAL INTELLIGENCE AGENCY

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- Attachments: 1. Analysis of prewar Soviet publications on nuclear physics (22 pages);
2. Bibliography of USSR atomic and scientific publications (21 pages);
3. Report on Soviet astronomy and cosmogony (4 pages).

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Attachment 1

Scientific

PRE-WAR RESEARCH ON NUCLEAR PHYSICS IN U. S. S. R.

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Post-war publications on Nuclear Physics research are so scanty that it may be useful to check the pre-war publications.

There was then even a kind of propaganda as shown, for instance, by the Conferences on Nuclear Physics where - at least in 1937 - Foreign Scientists participated.

Naturally, with the beginning of the war, information becomes more restrained, but papers of fundamental importance, at least in the field of theory, are still published. cf. FRENKEL's papers on fission theory. Information is also published about accelerators for charged particles: the electro-static generators in KHARKOV & LENINGRAD & the slow progress on the cyclotron in LENINGRAD. Disappointments in this respect led in 1938 to the creation of a Commission for the Atomic Nucleus to coordinate Nuclear Physics research. So far we have found no further information about the actual working of this Commission or of the Commission of Isotopes.

In the following pages is given a description of the organisation of the LENINGRAD Physico-Technical Institute. It should be remembered that the L.Ph.T.I. was then in close cooperation with the Radium Institute (see the Conclusions & Resolution re this Institute) & with the Industrial Institute & the Optical Institute in LENINGRAD, as can be seen from publications on related subjects made at these Institutes.

The Ukrainian Physico-Technical Institute in KHARKOV seemed to be mainly concerned with the construction of a van de Graaff generator & other electro-static generators. But research work done with these instruments seems to have remained poor, judging from the publications.

Other work on Nuclear Physics, some of high quality, has also been done at various other places such as :-Lebedev Institute, Institute of Physical Problems, & especially Siberian Physico-Technical Institute at TOMSK (IVANENKO).

Some biographical data are given of the heads of the most important departments: ALIKHANOV, VALTER & especially KURCHATOV & ARTSIMOVICH whose present work remains perfectly in the shadow although their importance is officially stressed by their position in the Ac.Sc. USSR.

Another leading man in this connection is Yuli Borisovich KHARITON who has just become a full Academician (Corr.M.Ac.Sc. since 1946) whose work on Chain reactions (U-pile), partly with ZELDOVICH is well known.

Another new full Academician, A.D. SAKHAROV (Lebedev Institute) though especially known for his work on Cosmic Radiation, may also be connected with Nuclear Physics research.

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Attached is a list of some more interesting pre-war publications from "Izvestiya Ac.Sc.", "Journal of Technical Physics", & "Journal of Experimental & Theoretical Physics" mainly to show the activity of the L.Ph.T.I., the Radium Inst. & the Ukr. Ph. T.I. KHARKOV, but important articles from other institutes have been included to give a cross-section of research in this field.

To round up, some information is attached taken from early post-war reviews & from the Soviet Encyclopedia.

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We have used the following abbreviations :-

- LENINGRAD Physico-Technical Institute.....L.Ph.T.I.
- Ukrainian Physico-Technical Institute,KHARKOV....Ukr.Ph.T.I.
- Radium Institute.....Radium Inst.
- Institute of Physical Problems.....Inst.Ph.Probl.
- Izvestiya PhysicsIzv.(Ph.)
- Journal Experimental & Theoretical Physics.....E.Th.
- Journal Technical Physics.....J.T.Ph.
- Corresponding Member Academy of Sciences USSR....C.M.
- Cosmic Radiation.....C.R.

In references the first figures after the abbreviated title of the periodical indicate volume & issue, the date of the issue follows in brackets & the last figures are the page numbers.

eg. E.Th. 10,3 (3.1940)357-60 = Journal Experimental & Theoretical Physics, volume 10 No 3,March 1940, pages 357-60

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NOTES ON THE PHYSICO-TECHNICAL INSTITUTE LENINGRAD.

Founded 1st January 1921.

1924 A.F. JOFFE & N.N. SEMENOV were at the head of the
Physico-Technical Laboratory.

1929 Combined with Physico-Technical X-Ray Institute to form
the State Physico-Technical Institute.

1930 Divided into 3 Institutes :-

LENINGRAD Physico-Technical Institute (JOFFE)
LENINGRAD Electro-Physical Institute (A.A. CHERNYSHEV)
LENINGRAD Institute of Chemical Physics (N.N. SEMENOV)
all three until 1936 under general direction of JOFFE.

1936 These 3 Institutes became independent.

1929- Ukrainian Physico-Technical Institute, KHARKOV organized
1930 & staffed with JOFFE's collaborators :-
I.V. OBRIMOV, K.D. SINELNIKOV, A.K. VALTER, e.a.

1929 Siberian Physico-Technical Institute at TOMSK :-
P.S. TARTAKOVSKI, M.I. KORSUNSKI.

1932 Urals Physico-Technical Institute at SVERDLOVSK for
metal-physics :-
Ya.G. DORFMAN, I.K. KIKOIN.

1932 New Physico-Agronomical Institute at LENINGRAD under
Joffe himself.

1933 New Physico-Technical Institute at DNEPROPETROVSK with
many collaborators of Joffe & LENINGRAD Physico-Technical
Institute. The great laboratory for X-ray structure
analysis under G.V. KURDIUMOV was completely transferred.

1939 LENINGRAD Physico-Technical Institute taken over by
Ac. Sc. USSR.

1941

(Aug.) Transfer to KAZAN. (but P.P. KOBKO e.a. stayed on in
LENINGRAD.)

1945

(Feb.) Return to LENINGRAD.

The L.Ph.T.I. concentrated from the beginning on semi-
conductors (A.F. & A.V. JOFFE, B.M. GOKHBERG, B.V. KURCHATOV,
V.P. ZHUZE e.a.), mechanical properties of solids (M.V. KLASSEN-
NEKHUDOVA, A.V. STEPANOV), mechanical properties of metals
(N.N. DAVIDENKOV), dielectricity of crystals (P.P. KOBKO,
I.V. KURCHATOV, B.M. VUL /seignette-electricity/), electro-
insulating materials from high-molecular compounds (P.P. KOBKO,
A.P. ALEKSEANDROV /"escapion" 1930/), atom-physics, photo effect,
X-rays (P.I. LUKIRSKI).
Later on it took over the study of Cosmic Radiation & of the
atomic nucleus, (in 1945, 10 Academicians & many Corr. Members).

A report on the activity of the L.Ph.T.I. in 1939 (signed
M.S. SOMINSKI 14.2.1940) cf. E.Th. 10,5 (May 1940) 576-80 giving as
foundation date 18th Oct. 1918 divides the organization into
3 groups:-

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I Electro-physics, II Physics of the atomic nuclei,

SECRET**CONTROL U. S. OFFICIALS ONLY****I Electro-physics : A.F. JOFFE with 6 laboratories :-**

- 1) Lab. for semi-conductors : A.F. JOFFE, B.I. DAVYDOV,
- 2) Lab. for copper-oxide rectifiers : P.V. SHAVARSKI, cand. Ph.M
- 3) Lab. for novel rectifiers : B.V. KURCHATOV, cand. Ph.M.,
- 4) Lab. for sulphur rectifiers : A.Z. LEVINSON,
- 5) Lab. for photo-elements : Yu.P. MASLAKOVETS, cand. Ph.M.,
- 6) Lab. for high-tension technique : B.M. GOKHBERG, Dr. Ph.M.
with sections for electrically strong gases &
for a 700 Kev. generator.

II The most interesting Physics of the atomic nucleus has 3 laboratories for the study of :-

- 1) beta-decay, 2) atomic nucleus, 3) fast electrons.

1) Laboratory for beta-decay : A.I. ALIKHANOV, C.M. Ac. Sc.

The aim of the work done in 1939 was :-

- a) for refinement & final establishment of results found previously.
- b) to find new methods to solve the problems of beta-decay & of Cosmic Radiation.

i.e. in case a) :-

- i. to investigate the tail of the spectrum by means of the double spectrograph & so finally to establish that in the framework of existing theory of beta-decay the neutrino has mass zero;
- ii. further to study the scattering of fast, relativistic electrons; from the large-angle scattering of those high-energy electrons it seems to follow that the laws of quantum mechanics are satisfied & that only Coulomb force & no special nuclear forces come into play.

in case b) :-

- i. methods had to be worked out for the observation of the recoiling atom in case of beta-decay (emission of nuclear electron) & of capture of orbital electrons, with the purpose to clear by direct experiment the problem of the existence of the neutrino & to find its mass; such a method was perfected & applied to the recoil of heavy nuclei suffering beta-decay.
- ii. methods had to be worked out for the observation & investigation of the ionizing component of Cosmic Radiation with the aim to construct a system of Geiger-Müller counters & amplifying valves such as to enable the investigation of the constitution & the properties of the Cosmic Radiation. After many great difficulties & special research on counters & valves such a system could be constructed.
- iii. methods had to be worked out for the observation of electron absorption in one elementary act & for a number of other problems. A method similar to that for the investigation of ionizing C.R. particles has been developed but there are special difficulties, so that the problem is not yet completely solved.

2) Laboratory for the study of the atomic nucleus :

I.V. KURCHATOV, Dr. Ph.M

In 1938 a weak electronic radiation accompanying the isomeric transformation of bromium was discovered in the L.Ph.T.I. This radiation consisted of internal conversion electrons emitted during the transition of the metastable isomeric nucleus into its ground state.

For 1939 the following problems were proposed :-

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- a) to show experimentally the correctness of the hypothesis

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- b) to investigate the mechanism of the radioactive processes in the case of nuclear isomerism of bromium, demonstrating a new fact : conversion radiation.
The problem of a detailed quantitative formation of the theory of metastable states of atomic nuclei in accordance with experiments will be a task of investigation for 1940.

In addition, work was started on the construction of an electronic accelerator, quadratron (cf. III problem 10) in cooperation with other sections of the L.Ph.T.I. (Ya.L.KHURGIN) & a first model is intended for the production of 3 Mev. electron, starting with 100 Volt electrons.
Some parts of the accelerator are already built & tested.

3) Laboratory for the study of fast electrons --

L.A.ARTSIKOVICH, Dr.Ph.M.

The plan of work for 1939 included : the investigation of the angular distribution of fast electrons scattered on nuclei of various elements.

For this purpose a magnet spectrograph with double focussing of electrons was built in 1939; the measurements will be made in 1940.

For this kind of work a powerful technical base, without which further work makes no sense, is necessary

The S.N.K. has given the Institute the means to build a power-cyclotron (cf. III problem 9); its construction will start in 1940.

III The molecular physics group has laboratories for the study of:-

- 1) polymers (A.P.ALEKSANDROVA, P.P.KOBEKO, where S.N.ZHURKOV is mentioned for his work on plastification).
- 2) mechanical properties of solids (N.N.DAVIDENKOV, steel research etc.)

Among the important tasks for 1940 are mentioned under :-

- 8) determination of the rest mass of the hypothetical particle neutrino.
- 9) construction of a mighty cyclotron (cf. II,3)
- 10) construction of the quadratron (accelerator of charged particles/cf.II,2b/).
- 11) fission of heavy nuclei under neutron bombardment.

From a report on the Scientific activity of the Ph.M. Section Ac.Sc.USSR during 1945 (cf. Izv.(Ph.)10,3(1946)319-29 we learn that the L.Ph.T.I. has worked on :-

Semi-conductors (A.F.JOFFE, Yu.A.DUNAEV cand Ph.M.,

Yu.P.MASLAKOVETS cand.Ph.M., S.M.RYBKIN.

Electric high-tension stabilization (B.M.GOKHBERG Dr.Ph.M.)

Electro-conductivity of amorphous media under pressure

(P.P.KOBEKO C.M.Ac.Sc., N.I.SHISHKIN Sen.Sc.Coll.)

Transition of polymers to caoutchouc-like state (S.N.ZHURKOV

cand.Ph.M., R.V.LERMAN Jun.Sc.Coll., S.Ya.PINER).

Metallic articles from liquid phase (A.V.STEPANOV Dr.Ph.M.)

Electric & mechanic properties of polymers (P.P.KOBEKO, prof. N.N.DAVIDENKOV)

Sound properties in water (G.D.MALIUZHINETS cand Ph.M.)

Electronic phenomena (P.I.LUKIRSKI C.M.Ac.Sc.)

Magnet spectrograph (G.D.LATYSHEV Dr.Ph.M.)

The Pamir expedition (SKOBELTSYN-VEKSLER) is noted as work of the Lebedev Institute., the Mt. Alagaz expedition (A.ALIKHANIAN) as that of the Institute of Physical Problems. The latter

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Institute is also credited with work on Low Temperature Physics (KAPITSA, PESHKOV, N.S.ALEKSEEVSKI, A.I.SHALNIKOV) and the Lebedev Institute with work on the Theory of the Atomic Nucleus (G.D.LATYSHEV), Radio-physics (PAPALEKSI, FOX), Non-linear vibrations (S.M.RYTOV, A.M.PROKHOROV, M.E.ZHABOTINSKI), Applications of the theory of non-linear vibrations (A.A.ANDRONOV, G.S.CORELIK, S.M.RYTOV), Physical optics (S.I.VAVILOV, B.A.FRIDMAN, A.A.CHEREPNEV, M.A.KONSTENTINOVA, V.L.LEVSHIN), Intramolecular forces (G.S.LANDSBERG, N.A.BOZHULIN, Kh.E.STERIN, N.N.SOBOLEV, M.A.ALENTSEV), and Dielectric, Seignette section (B.M.VUL, I.M.GOLDMAN) indicating a new distribution of work & a new way of reporting.

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The heads of the 3 laboratories of the Group II - Nuclear Physics - of the L.Ph.T.I. are :-

- Lab.No 1 - Beta-decay : Abram Isaakovich ALIKHANOV,
- Lab.No 2 - Nuclear Physics : Igor Vasilievich KURCHATOV,
- Lab.No 3 - Fast electrons : Lev.Andreevich ARTSIMOVICH.

Lab. No 1

Abram Isaakovich ALIKHANOV is well known enough; the severe attacks on his work on varitrons have had no consequences lately his brother has resumed the work on C.R. using methods developed by ALIKHANOV. (Doklady 92,6(21.10 53)1109-1112)

JOFFE in his "Notes on the History of the Ac.Sc.USSR" 1945 mentions that ALIKHANOV was working at the Atomic Nucleus & C.R. in the L.Ph.T.I. but had later gone to the Institute of Physical Problems.

Lab.No 2

Igor Vasilievich KURCHATOV, was born 12.1.1903;

- 1935 : Director of Nuclear Forces Laboratory,
Head of Nuclear Physics Section L.PPh.T.I,
- 1943 : Academician,
- 1944.4.11 : Labour Red Banner,
- 1945 6.3. : Labour Red Banner,
- 1945 11.6.: Head of Lab.No 2 Ac.Sc.USSR,,
- 1945 9.12 : Order of Lenin,
- 1950.12,3 : Member of Supreme Council USSR.

Publications on nuclear isomerism & nuclear disintegration;
also on Seignette-electricity.

Together with G.D.LATYSHEV, L.M.NEMENOV, I.P.SELINOV :-
in non-Russian language

- cf. Zeitschrift für Physik (Soviet Union)8 (1935)589;
- Comptes Rendus (Paris)200 (1935) 1291-2162;
- Le champ moléculaire dans les diélectriques.1936
Paris, Lehmann & Cie, Act.Sc.& Ind.No 338

in Russian language in Izv.(Ph.)
together with Dr.Ph.Math.L.I.RUBINOV :-
Isomerism of atomic nuclei.

It is stated in Yubileiny Sbornik Ac.Sc.USSR 1947 vol I
pp 285-305 :-

- 1935 : together with B.V.KURCHATOV & L.V.MYSOVSKI discovered
3rd period of beta-decay of the bromium nucleus when
irradiated by neutrons;
- 1937 : internal conversion of electrons radiation, nuclear
isomerism; experiments of A.A.YUZEFOVICH & RUBINOV:
energy spectrum of conversion electrons by means of
magnet spectrograph;
G.S.ZAVELEVICH : Theory of rel. conversion
coefficient;
I.V.KURCHATOV with collaborators of Radium Inst.
experimented on short-lived isomerism of various
elements;
L.I.RUBINOV & Ya.M.IGELNITSKI investigated long lived
isomerism.

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no reference to further work in RUSSIA is given in this

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report & no further reference is given elsewhere to his more recent scientific work though in October 53 he was again elected to the Praesidium of the Academy of Sciences.

In 220 years Ac.Sc.1725-1945 : Notes on the History of the Ac.Sc.1945 I.V.KURCHATOV, together with prof. L.V.MYSOVSKI, is credited by KHLOPIN as having built the cyclotron of the Radium Inst. LENINGRAD. cf. Izv.(Ph.P4(1940)372-75. (cf. also Critique on Radium Inst. (Izv: (Ph.)5-6(1938)790-92) JOFFE says in the same "Notes" that KURCHATOV has worked "until recently" in the L.Ph.T.I.

Lab.No 3

Lev Andreevich ARTSIMOVICH
Dr. Ph.-Math, prof. MOSCOW Mech.Institute.

According to new edition of Soviet Encyclopedia : born 1909
C.M.Ac.Sc.USSR, elected full Academician October 1953.

1939- : his experimental data on Bremsstrahlung & angular
1940 distribution of scattered electrons showed the correctness of the present ideas of Quantum Mechanics on fast electrons.

1943 : electron optics; theory of chromatic aberrations of electron-optical systems;
also theoretical study of the radiation emitted by electron accelerators.

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He is not listed among the speakers of I Conference on Electron Microscopy, MOSCOW 15-19 Dec. 1950 (Izv.(Ph.)15,3 (1951), indicating perhaps that he is now more closely - (exclusively ?) - connected with nuclear physics, especially the theory & construction of accelerators for charged particles as according to our pre-war information he already was more intimately connected with these problems than can be seen from the Encyclopedia.

The Ukrainian Physico-Technical Institute in KHARKOV
is mainly known by the work of Anton Karlovich VALTER, professor, full Member Ukr.Ac.Sc.

According to Progress of Physics (USSR) 45,4(Dec.51)622 he started his scientific work 1923, working in dielectrics, electro-conductivity, high-tension electricity; he later devoted himself to nuclear physics at the Ukr.Ph.T.I. Well-known is his part (together with SINELNIKOV, LANGE e.a.) in the construction of the electro-static generator of the Institute.

1951 he was Deputy director of the Scientific Branch of the Physico-Technical Institute of the Ukrainian Ac.Sc.

He seems to devote himself mainly to organisational work and to the writing of popular books.

The new edition of the Soviet Encyclopedia does not mention him, & his candidature to the Ac.Sc.USSR was not successful.

The Ukr.Ph.T.I. has recently worked on crystal & metal physics & on Low Temperature physics.

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SECRET**CONTROL U. S. OFFICIALS ONLY**Conferences & Commissions

A first Conference on Nuclear Physics was held in Sept. 1933

The II All-Union Conference on the Atomic Nucleus took place in MOSCOW 20-26 Sept. 1937.

In addition to 120 Soviet Physicists were also present & took part in the discussions :-

W. PAULI (ZURICH), P. AUGER (FRANCE),
E. J. WILLIAMS (MANCHESTER), R. PEIERLS (CAMBRIDGE).

The Institutes represented were :-

LENINGRAD Physical Technical Institute (L.Ph.T.I.),
State Radium Institute,
Physical Institute Ac.Sc. MOSCOW (Ph.I.Ac.Sc. MOSCOW),
Institute of Physical Problems (I. of Ph. Probl.), & the
Ukrainian Physical Technical Institute, KHARKOV (Ukr. Ph. T. I.)

The reports & discussion can be grouped around the following subjects :-

Russian particle accelerators,
pair production,
gamma-rays & fast electrons,
Cosmic Radiation
beta-decay,
neutrons,
nuclear forces.

The Russians had then in KHARKOV a generator of the van de Graaff type giving a maximum of 4 000 000 Volts, & for practical work a well-focussed beam of electrons of 2 500 000 Volts. (A.K. VALTER, K.D. SINELNIKOV, A. Ya. TARANOV, Ukr. Ph. T. I. reporting)

A cyclotron of the Lawrence type providing protons of 3 200 000 Volts was built on the initiative of L.V. MYSOVSKI in the Radium Institute LENINGRAD (V.K. RUKAVISHNIKOV of the Radium Inst. reporting).

The detailed study of the phenomena of creation electron-positron pairs by gamma radiation, after its discovery in 1933, was at that time a fundamental problem of Physics, & closely connected with it is the general behaviour of fast, high-energy electrons, their radiation, their scattering by atomic nuclei.

Reports by :-

I.E. TAMM, I.M. FRANK, P.A. CHERENKOV (Lebedev Inst.) : On visible radiation of pure liquids due to the effect of fast neutrons;
A.I. ALIKHANOV (L.Ph.T.I.) : On pair formation under the action of gamma-rays;
A.I. ALIKHANIAN, B.S. DZHELEPOV, P.E. SPIVAK (L.Ph.T.I.) : On the angles between the components of pairs;
L.V. GROSHEV, I.M. FRANK (Lebedev Inst.) : On pair formation in krypton by gamma-rays;
E.J. WILLIAMS (MANCHESTER) : On emission of radiation of electrons of 2 000 000 Volt energy, (transl by JOFFE);
D.V. SKOBELTSYN (L.Ph.T.I.) : Les phenomenes anormaux accompagnant l'absorption des rayons beta rapides;
E.G. STEPANOVA (L.Ph.T.I.) : On scattering of fast electrons by nuclei.
G.D. LATYSHEV (Ukr. Ph. T. I.), V.M. DUKELSKI (L.Ph.T.I.), A.F. JOFFE, P. AUGER (PARIS), L. ARTSIMOVICJ (L.Ph.T.I.), N.I. ROZEN, Ya.I. FRENK FRENKEL also took part in the discussion.

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Conference on the Atomic Nucleus Leningrad1-5 October 1938

Another Conference on the Atomic Nucleus was held at Leningrad 1-5 October 1938 with more specific reports than at the 1937 Conference which had laid the foundations of this work.

Problems of Cosmic Radiation :-

- V.I. VEKSLER, K.I. ALEKSEEVA, N.M. REINOV (Lebedev Inst.) ;
 Heavy electrons in C.R. ;
 A.P. ZHDANOV (Radium Inst.) : Nuclear disintegration by C.R. ;
 I.E. TAMM : The penetrating C.R. component.
 S.N. VERNOV (Lebedev Inst.) : Latitude effects in the stratosphere ;
 N.I. IVANOVA (L.Ph.T.I.) : Two C.R. components & Rossi curve ;
 G.Kh. FRANK-KAMENETSKI (L.Ph.T.I.) : Secondary radiation ;
 N.A. DOBROTIN, N.S. IVANOVA, B.M. ISAEV (Lebedev Inst.) :
 Properties of "back-ray" showers.

Another series of reports may be grouped around the behaviour of fast electrons.

- K.D. SINELNIKOV, A.K. VALTER, A Ya. TARANOV, A.V. IVANOV,
 V.S. GUMENIUK (Ukr.Ph.T.I.) : Absorption of high-energy electrons
 L.A. ARTSIMOVICH & V.A. KHRAMOV (L.Ph.T.I.) : Energy losses of fast electrons.
 D.V. SKOBELTSYN (L.Ph.T.I.) : Les rayons - normaux & anormaux ;
 P.A. CHERENKOV (Lebedev Inst.) : Radiation of fast electrons ;
 L.V. GROSHEV & I.M. FRANK (Lebedev Inst.) : Pair formation.

Problems connected with nuclear isomerism, i.e. the existence of metastable states of atomic nuclei possessing the same mass number & the same atomic number as the ordinary nucleus. I.V. KURCHATOV & his collaborators had just done important original research in this field.

- L.I. RUSINOV & A.A. YUZEFOVICH (L.Ph.T.I.) : Nuclear isomerism of bromine (reporting also on work by V. & I. KURCHATOV, L. MYSOVSKI - cf C.R./PARIS/ 200 (1935)1201 & of ALIKHANIAN, ALIKHANOV & DZHELEPOV ;
 I.I. GUREVICH & G.R. RIK (Radium Inst.) : On the distribution of nuclear levels ;
 I.E. TAMM : Isotope shift of spectral lines ;
 K.D. SINELNIKOV, A.K. VALTER, V.S. GUMENIUK, A.V. IVANOV (Ukr.Ph.T.I.)
 Threshold value of photo-electrons ; disintegration of beryllium with references to work by ALIKHANOV & LATYSHEV, PETUKHOV, ARTSIMOVICH & PALADIN, V.S. DEMENTI, A.I. LEIPUNSKI & V.A. MASLOV.

Finally details were given on the construction & work of the impulse generator for 4 million Volts by G.F. KON-PETERS (N.F. COHN-PETERS), F.F. LANGE, V.S. SHPINEL (Super-high-tension Laboratory Ukr. Ac. Sc. KHARKOV).

This conference had apparently not the same importance as the 1937 Conference. The reports deal with problems of actual research without attempting a broad discussion & review. This is a normal procedure & just indicates that the Russians were settling down to the investigation of questions of detail,

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Reports on Cosmic Radiation were made by:

P. AUGER (PARIS) : Deux groupes dans les rayons cosmiques;
 A. B. VERIGO (Radium Inst.) : Results of stratostat USSR-1 bis;
 S. N. VERNOV (Lebedev) : Investigation of C.R. in stratosphere by means of transmitted W/T signals;
 V. I. VEKSLER (Lebedev Inst.) : Investigation of ionization bursts by the coincidence method on Mt. Elbrus
 In addition to the speakers on this subject JOFFE, SKOBELTSYN, PAULI (ZURICH), AUGER (PARIS), WILLIAMS (MANCHESTER), VALTER, TAMM & N. S. IVANOVA (L. Ph. T. I.) took part in the discussion.

In connection with the problem of beta-decay, A. I. ALIKHANIAN reported on experimental research on the neutrino mass, W. PAULI spoke on fundamental theoretical problems. G. BOEK, A. I. ALIKHANOV, A. F. JOFFE, R. PEIERLS, I. E. TAMM took further part in the discussion.

The remaining part of the Conference was devoted to the interaction of neutrons & protons with the atomic nucleus & to theoretical investigations into the action of nuclear forces. Reports given by :-

I. V. KURCHATOV (L. Ph. T. I.) : Interaction of neutrons & nuclei with references to the work of ARTSIMOVICH, MYSOVSKI, SHCHUPIN, GUREVICH & MESHCHERIAKOV, RUSINOV & LATYSHEV:
 A. I. LEIPUNSKI, D. V. TIMOSHCHUK, E. FEDOROV (Ukr. Ph. T. I.) : scattering & absorption of photo-neutrons;
 A. I. LEIPUNSKI & L. I. RUSINOV (Ukr. Ph. T. I. & L. Ph. T. I.) : Absorption of C-neutrons in silver, cadmium, & boron at various temperatures (cf. also Nature (1936) 326;
 I. Ya. POMERANCHUK (Ukr. Ph. T. I.) : scattering of slow neutrons on the crystal lattice;
 N. N. DZIRIEV (St. Radium Inst.) : Formation of light artificial radio-elements under the action of neutron bombardment;
 N. A. DOBROTIN (Lebedev Inst.) : Angular distribution of protons in collisions with fast neutrons;
 I. E. TAMM (Lebedev Inst.) : Nuclear Forces;
 P. P. PARINSKI (LENINGRAD University) : Scattering of protons by protons;
 Ya. I. FRENKEL (L. Ph. T. I.) : On the statistical theory of α -decay
 In the discussion on neutrons & on nuclear forces also took part A. I. JOFFE, I. I. GUREVICH (Radium Inst.), A. F. JOFFE, W. PAULI (ZURICH),

The concluding words, as well as the opening words were spoken by A. F. JOFFE.
 The Conference gave a typical cross-section of Russian research as far as is known from available other publications.

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SECRET**CONTROL U. S. OFFICIALS ONLY**

SECRET**CONTROL U. S. OFFICIALS ONLY**Conclusions of the Commission of the Physics Group Ac.Sc.USSR

Following the reports of the Conference on Problems of the Atomic Nucleus held in LENINGRAD 1-5 October 1938 are published without date in Izv.(Ph.)5-6(1938)790-792 the Conclusions of the Commission of the Physics Group Ac.Sc.USSR on the work of the Radium Institute at LENINGRAD.

It is stressed that there have been a number of interesting investigations on actual problems including for instance :-

- 1) I.I.GUREVICH & G.R.RIK : On the distribution of nuclear levels;
- 2) A.P.ZHDANOV : On the disintegration of atomic nuclei by C.R.;
- 3) Prof. GROSHKOV & Sc.Coll. IONOV : Determination of radium, megathorium & radio-thorium in mixtures of preparates.

The Commission then mentions work not completed in 1938 & planned for the future especially that of prof. L.V.MYSOVSKI on nuclear recoil utilising the great Wilson cloud chamber & on the angular distribution of scattered particles.

The Commission is critical of other plans, such as on Cosmic Radiation, important in itself but not fitting to proper work of the Institute which is more on the lines of Chemistry & Geochemistry of radioactive elements.

Duplication of work should be avoided, similar problems being investigated in other Institutes such as L.Ph.T.I.

The Commission is critical of the work on the cyclotron which drags on for 4 years already : the cyclotron attaining at present only 3.5 Mev instead of 6 Mev which should be possible with the present electromagnet; the current obtained is considered too weak, & the functioning is not stable at all so that until now not one research problem has been executed.

Standards of radio active preparates have been produced by A.B.VERIGO & his collaborators.

A number of great specialists in Nuclear Physics such as I.V.KURCHATOV & A.I.ALIKHANOV are attached to the Institute but they find difficulties there & have to work in the L.Ph.T.I. Often electric current was lacking.

The following Resolutions on the work of the Radium Institute again stresses that while some good work has been done the cyclotron after 4 years is still not usable for research work.

To improve the work a single authority should be necessary. The Institute should concentrate on natural & artificial radioactivity.

Then follows a Resolution on the Organisation of Work on Nuclear Physics in the Soviet Union stating the following points :-

- 1) It is considered necessary to concentrate in future all work on Nuclear Physics in the hands of the Ac.Sc.USSR;
- 2) Organisational measures should be taken so that no interruption of the work may occur which might considerably slow down the speed of development of Nuclear Physics. Particularly important is the immediate construction of a cyclotron in the L.Ph.T.I.
- 3) With the aim of guidance & coordination of the work on Physics of the Atomic Nucleus it is necessary to organise with the Phys.Math.Section Ac.Sc.USSR a

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- 3) permanent Commission on the Atomic Nucleus.
The primary task given to this Commission should be to examine the problem of coordination of the themata for the Nuclear Laboratories & to provide the Laboratory of the L.Ph.T.I. with radium. It is further desirable that problems connected with organisational work on Nuclear Physics & related subjects should be preliminarily coordinated by the Commission Ac.Sc. for the Atomic Nucleus.
- 4) It is necessary to develop work on Nuclear Physics in Universities & to create corresponding classes in leading Universities of the Soviet Union.
- 5) There is great delay in publication of scientific papers on Nuclear Physics due to unsatisfactory work of the physical periodicals so that it is difficult to get acquainted in time with the work of Soviet Physicists & in a number of cases they are deprived of their priority.
- 6) It is to be noted that Scientific Institutes concerned with Nuclear Physics have until now not attached sufficient importance to problems of practical application of work on the Atomic Nucleus. An urgent task of Nuclear Physics for the immediate future is the development of every kind of work connected with application to technical problems.

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SECRET **CONTROL U. S. OFFICIALS ONLY**
Conference on Nuclear Physics, KHARKOV
15-20 Nov. 1939

According to a report by N. N. SOBOLEV in E. Th. 10, 1 (1940) a further Conference on Nuclear Physics took place in KHARKOV, 15-20 Nov. 1939 with as main subjects :-

- 1) Cosmic Radiation, (reporting D. V. SKOBELTSYN)
- 2) Neutrons, (rep. A. I. LEIPUNSKI)
- 3) Radio-activity & nuclear reactions, (N. G. KHLOPIN)
- 4) Technique of particle acceleration. (F. F. LANGE)

S. N. VERNOV gave a critical report on the Cascade Theory of C.R. showing certain disagreement between theory & observation.

K. I. ALEKSEEVA spoke on meson decay,

G. D. LATYSHEV on gamma radiation.

A number of papers dealt with U-fission :

Ya. B. ZELDOVICH & Yu. B. KHARITON showed that chain reactions were only possible by enrichment with isotopes,

I. V. KURCHATOV had investigated short periodic radio-activity by means of photo-emulsions,

A. A. GRINBERG had used tracer elements for the study of the chemistry of complex compounds,

S. Z. ROGINSKI used traces for the study of chemical kinetics & catalysis.

V. S. GOTT, M. I. KORSUNSKI, F. F. LANGE reported on high ionic currents.

The available information on this Conference is too scanty but fits in with research published elsewhere, showing steady development without unusual discoveries.

Commission on Isotopes

MOSCOW, Staromonetny per. 35

Chair. vacant

Dep. Chair. : V. G. KHLOPIN

(According to "World of Learning" UNESCO, 1950 but not mentioned in 1952 edition.)

Commission on Atomic Nucleus

Not mentioned in UNESCO's "World of Learning".

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The normal work goes on & a fair cross-section can be seen later from the Nuclear Physics issue of Izv.(Ph.)No 4 1940.

- D.V. SKOBLITSYN (Lebedev Inst.) : gives a report on the actual situation in C.R. research; then follow a number of papers on special problems in C.R.
 K.I. ALEKSEIEVA (Lebedev Inst.) : Penetrating particles;
 S.N. VERNOV (Lebedev Inst.) : Cascade Theory;
 V.I. VEKSLER & N.A. DOBROTIN (Lebedev Inst.) : Slow mesons
 A.P. ZHDANOV (Radium Inst.) : Splitting of atomic nuclei;

Connected with C.R. problems are the following papers on fast electrons :

- K.D. SINELNIKOV, A.K. VALTER, A.V. IVANOV (Ukr.Ph.T.I.) : On calorimetric measurements of radioactive energy losses for fast electrons;
 L.A. ARTSIMOVICH & M. BREDOV (L.Ph.T.I.) : Bremsstrahlung of fast electrons,
 M.D. BORISOV, V.P. BRAILOVSKI, A.I. LEIPUNSKI (Ukr.Ph.T.I.) : On scattering of fast electrons;
 L.V. GROSHEV (Lebedev Inst.) : On Pair-creation;
 A.B. MIGDAL (L.Ph.T.I.) : On ionization of atoms & pair-formation by nuclear reactions;

- Another group of papers is devoted to the nuclear forces :
 A.I. ALIKHANIAN & S.Ya. NIKITIN (L.Ph.T.I.) : Investigating the details of the beta-spectrum by means of a double magnetic spectrometer;
 A.I. LEIPUNSKI (Ukr.Ph.T.I.) : reviews BOHR & WHEELER's theory of nuclear fission & some experimental data of his own laboratory indicating for instance that chain reactions for U in water seem doubtful.
 N.A. PERFILOV (Radium Inst.) : Investigates tracks of recoiling nuclei;
 K.A. PETRZHAK (Radium Inst.) : has studied range & energy of fission fragments finding for instance that the effective charge within the first one cm. range, of the fragments is 12, in accord with the theory of A. MIGDAL;
 V.G. KHLOPIN (Radium Inst.) : reports on the chemical nature of the fission fragments;
 L.I. RUSINOV & G.N. FLEROV (L.Ph.T.I.) : have experimented on U fission & found that there are 2-4 secondary neutrons per fission.

The above mentioned papers show a good standard of work, perhaps surprisingly good, considering the circumstances.

None of the papers devoted to collision problems, nuclear isomerism & isotopes are of particular importance :

- V.S. DEMENTI & D.V. TIMOSHUK (Ukr.Ph.T.I.) : Absorption of fast neutrons;
 T.A. GOLOBORODKO & A.I. LEIPUNSKI (Ukr.Ph.T.I.) : Scattering of photo-neutrons of various energies by atomic nuclei;
 L.I. RUSINOV & A.A. YUZEPOVICH (L.Ph.T.I.) : Nuclear isomerism of bromine;
 I.V. KURCHATOV (Radium Inst.) : Metastable levels of the gadolinium nucleus;
 I.I. GUREVICH (Radium Inst.) : Phase transitions in nuclear matter;
 V.G. KHLOPIN (Radium Inst.) : Radiation traces;
 A.A. GRIMBERG (First Medical Inst. i/n Pavlov & Radium Inst.) : Application of radioactive traces for the solution of some problems of the Chemistry of complex compounds with references to work by F.M. FILINOV;
 S.Z. ROGINSKI (Radium Inst.) : New applications of artificial radio elements.

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Finally a number of papers deal with accelerators for charged particles :-

- I.V.KURCHATOV (Radium Inst.) : On the work of the cyclotron of the Radium Institute. Date given : diameter : 34 cm, intensity of neutron radiation : 2.3 Mev corresponding to 1 kg radium/beryllium; further increase to 3.5 kg radium/beryllium.
- A.F.JOFFE & B.M.GOKHBERG (L.Ph.T.I.) : Models of electro-static generators.
- F.F.LANGE & V.S.SHPINEL (Ukr.Ph.T.I.) : Methods of obtaining fast corpuscular rays, claiming 5 Mev for the Van de Graaff generator in KHARKOV when the cyclotron at Berkeley had attained 8 Mev.
- F.F.LANGE & L.I.PICOVAR (Ukr.Ph.T.I.) : The compact impulse aggregate (electronic beam of 1 Mev.)
- F.F.LANGE & V.S.SHPINEL (Ukr.Ph.T.I.) : Spectrum of cathode beam in impulse tube
- K.D.SINELNIKOV, A.K.VALTER, Ya.G.DZHIAN (High Tension Laboratory Ukr.Ph.T.I.) : Optimum shape of conductor of electro-static generator.
- V.S.GOTT, M.I.KORSUNSKI, F.F.LANGE (Lab. of High-tension phenomena Ac.Sc.KHARKOV) : Method to obtain strong ionic currents.

Interesting is the relatively successful work with electro-static generators & the modest successes with a cyclotron - cf. also Conclusions & Resolution on the Radium Institute Izv.(Ph.)5-6 1938. No details are given on research work done by means of these instruments.

220 Years Ac.Sc.USSR 1725-1945

It may be interesting to look for comparison at the first post-war review given in "220 Years Ac.Sc. USSR : Notes on the History of the Ac.Sc.

Nuclear Physics & C.R. are of course mentioned but **without** special accentuation.

A cyclotron built by prof. L.V.MYSOVSKI & Ac.I.V.KURCHATOV e.a. is mentioned in connection with the Radium Institute where artificial radio-elements & radio-active traces are exploited since 1939.

Research in Nuclear Chemistry has been done there by V.G.KHLOPIN, A.E.POLESITSKI (died during the war), A.A.GRINBERG, M.A.PASVIK, N.F.VOLKOV, F.M.FILINOV e.a. In this connection should also be mentioned in Geochemistry the work by I.E.STARIK & E.G.GERLING on migration of radio-elements.

KHLOPIN is credited as having created the Radium Industry. STALIN Prize for V.G.KHLOPIN, B.A.NIKITIN, A.E.POLESITSKI for their book : Radiothorium, its production & application for war purposes 1943.

As outstanding achievement is mentioned the discovery of the spontaneous fission of uranium by K.A.PETRZHAK & G.PLEROV L.Ph.T.I. 1940.

A vague reference is given to the work of A.I.ALIKHANOV on the Atomic Nucleus & C.R. (L.Ph.T.I., later I.Phys.Problems.), & of I.V.KURCHATOV on natural & artificial radio-activity (until recently L.Ph.T.I.) !

D.V.SKOBELTSYN is mentioned as Head of the C.R.Laboratory (No 5) of the Lebedev I. & I.E.TAMM as Head of Lab.No 7 (Theory).

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- 8,1 31-34 : O.D.ROZHANSKAYA (L.Ph.T.I. 19.9.37) :-
Influence of electric field on photo-electron
emission. ackn to P.I.LUKIRSKI.
- 8,2 122-23 : V.B.DEMENTI, A.I.LEIPUNSKI, V.A.MASLOV,
(Ukr.Ph.T.I. 7.12.37) :-
Probability of nuclear photo-effect of Be &
absorption of photo-neutrons by Rh & Ag nuclei.
- 127-38 : I.D.ROZHANSKI & Ya.I.FRENKEL (8.10.37) :-
Quantum Theory of spiral orbits of electron in
Coulomb field.
/Note : application to cyclotron !/
- 148-53 : V.B.BERESTETSKI (L.Ph.T.I. 27.10.37) :-
The optics of material media based on the Quantum
Theory of light.
/Note : Application to Cherenkov-effect./
- 253-59 : V.V.CHERDYNTSEV (L.State Radium Inst. 21.11.37) :-
On the binding energy of the atomic nucleus &
alpha-decay.
- 260-66 : D.IVANENKO (Siberian Ph.T.I., TOMSK 14.12.37) :-
Notes on the Theory of interaction by particle
exchange.
- 8,4 397-400 : E.STEPANOVA (L.Ph.T.I. 25.1.38) :-
Single scattering of fast beta-particles in argon.
- 8,6 623-38 : I.I.GUREVICH, A.P.ZHDANOV, A.N.FILIPPOV, :(State
Radium Inst. & Phys. Inst.LENINGRAD St. Univ.27.3.38
Disintegration of nuclei by Cosmic Radiation.
- 639-43 : D.IVANENKO, A.SOKOLOV (Siberian Ph.T.I.TOMSK 19.3.38
On the math.formalism of the C.R.shower theory.
- 644-57 : A.SOKOLOV (Siberian Ph.T.I.TOMSK 22.2.38)
On the possibility of a neutrino theory of the
electro-magnetic field.
/Note : ideas of L.de BROGLIE, which also presently
find attention in Russia but see V.A.FOK's critique
in E.Th.8,7(38)771-78/.
- 697-700 : M.BORISOV, V.BRAULOVSKI, A.I.LEIPUNSKI (Ukr.Ph.T.I.
13.3.38) : Primary ionization by fast electrons in
nitrogen.
- 8,7 779-90 : N.N.DMITRIEV (Radium Inst. Len.24.3.38) :-
Heavy particles from nuclei of artificial radio-
elements under neutron bombardment. ackn to prof.
L.V.MYSOVSKI, prof. I.V.KURCHATOV & P.P.PAVINSKI.
- 791-93 : I.I.GUREVICH (State Radium Inst. Len.Neutron Lab.
1.4.38)
On a method to determine the energy spectrum of
fast neutrons (from recoil protons). ackn to prof.
Dr. I.V.KURCHATOV.

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- 8, 8-9 885-93 : I. KURCHATOV, A. MOROZOV, G. SHCHEPKIN, P. KOROTKEVICH,
Chairs of Exp. & Theoretical Physics LEN. State Fed. I.
i/n M. N. POKROVSKI 16.7.38) :-
Disintegration of boron by slow neutrons, with ref. to
I. & B. KURCHATOV & LATYSEV : C.R. (PARIS) 200(35) 1199
- 894-906 : I. POMERANCHEV (Ukr. Ph. T. I. 28.4.38) :-
Scattering of slow neutrons on a crystal lattice.
- 907-12 : L. E. LAZAREVA (Lebedev Inst. 9.5.38) :-
Scattering of neutrons on protons. (ackn. to I. M. FRANK
for guidance.)
- 913-29 : L. ARTSEMOVICH & V. KURATOV (L. Ph. T. I. 31.5.38) :-
Bremsstrahlung of high-energy electrons.
/Note : important for C.R. & for cyclotron./
- 930-44 : B. LIPSHITS (Ukr. Ph. T. I. 19.3.38) :-
Collisions of deuterons with nuclei.
- 1026-30 : A. L. LEIPUNSKI (31.3.38) :-
Shift of Curie-point under pressure.
/Note : This is electro-magnetism; LEIPUNSKI is
usually concerned with nuclear physics./
- 8, 10- 1065-76 : S. RYZHANOV (16.6.38) :-
11 quanta bremsstrahlung by neutrons & protons scattered
by nuclei. (ackn. to FRENDEL).
- 8, 12 1229-33 : K. D. SIVELNIKOV, A. K. VALTER, V. S. GUMENIUK, A. V. IVANOV,
(Ukr. Ph. T. I. 21.7.38) :-
Limits of nuclear photo-effect for beryllium, with
ref. to ARTSEMOVICH & PALATIN : Soviet Physik 7(35)
254; RUSINOV & SAGALDAK : J. Th. 6(36) 886.
- 1234-40 : V. V. CHERDYNTSEV (Radium Inst. LEN. 7.8.38) :-
On "free competition" of nuclear processes.
ackn. to FRENDEL for guidance.
- 1939
9, 2 127-42 : K. D. SIVELNIKOV, A. VALTER, A. TARANOV, A. IVANOV,
V. GUMENIUK (Ukr. Ph. T. I. 30.10.38) :-
Absorption of fast neutrons in lithium, carbon,
aluminium, copper, lead, with ref. to SKOBLITSYN &
SHEPANOVA : Nature 137 (1935) 234.
- 143-50 : G. N. FLEROV (L. Ph. T. I. 29.10.38) :-
Absorption of slow neutrons in cadmium & mercury.
/Note : Important for "piles"/
ackn. to I. V. KURCHATOV & G. Ya. SHCHEPKIN.
- 9, 3 237-39 : B. LIPSHITS (KHARKOV, Chem. Techn. Inst. i/n KIROV 28.12.38)
Transfer of neutrons in collisions of heavy nuclei.
(Theory).
- 240-45- : V. V. CFI & I. V. PISKUNOV (LEN. 1937; 23.12.38)
54 Scattering of fast electron beams of 1 - 2 Mev
Emission from impulse tubes of 1 - 3 Mev
- 9, 5 517-23 : K. I. KORSUNSKI, N. N. NIKOLAEVSKAYA, M. A. BAK :-
work (1937 in Leningrad 20.2.39) :-
Photo-neutron effect on beryllium.
(with excitations of 1550-1650 KV)
- 524-25 : Electron spectrum of radio-active iodine (2.6 Mev)
/These 2 papers are interesting as showing research
work done with accelerators of charged particles :
cyclotron or electro-static generator./

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- 9,6 641-53 : Ya I. FRENKEL (L.Ph.T.I. 14.4.39) :-
Electro-capillary Theory of Fission of heavy nuclei by slow neutrons.
/Note : This is the first attempt to a theory of fission, in certain points in advance even of BOHR WHEELER's famous theory published somewhat later in Physical Review 56 (1939)426; ref. also J. of Ph. (USSR 1,2 (39)125, & a previous paper in Sov. Ph. 9 (1936)533; Ph.R.55 (1939)987. Further details have been published by FRENKEL in J. of Ph. (U.S.S.R) 10(1946)533 : On some feature of the process of fission of heavy nuclei. see also below 9,8(39) & 10,4(40)/
- 654-57 : N.N. DMITRIEV, K.A. PETRZHAK, N.A. PERFILOV (Radium Inst. 17.3.39) :-
On possible formation of radio-active nuclei by decay of radio-active chlorine.
- 9,7 771-74 : V.S. DEMENTI, A.I. LEIPUNSKI, D.V. TIMOSHUK (Ukr. Ph. T. I. 19.5.39)
Deceleration of neutrons in water. ackn. to I. POMERANCHUK & AKHIEZER.
/Note : Important for pile construction/.
- 9,8 889-914 : Ya. FRENKEL & V. CHERDYNTSEV (L.Ph.T.I. & Radium I. 14.4.39) :-
On a gaseous model of the nucleus.
/Note : see note for 9,6,641-53/
- 915-19 : I. POMERANCHUK (L. St. University 13.6.39) :-
Maximum energy of primary C.R. electrons.
/Note : This paper has become important in problems of C.R. origin/.
- 927-29 : L. ARTSIMOVICH (L.Ph.T.I. 26.5.39) :-
Criteria for single scattering of electrons (Theory).
- 9,9 1027-28 : T. GOLOBORODKO & A. LEIPUNSKI (Ukr. Ph. T. I. 5.7.39) :-
Scattering of photo-neutrons from deuterium by nuclei of light elements.
- 1029-33 : Yu. A. NAMILOV (L. St. Univ. 7.7.39) :-
Splitting of beryllium by alphaparticles & of chlorine by neutrons. ackn. to I. V. KURCHATOV & V. M. DUKELSKI.
- 1034-35 : L. ARTSIMOVICH (L. Ph. T. I. 22.7.39) :-
On the anomalous Brems-effect of fast neutrons.
- 9,10 1163-65 : A. MIGDAL (L. Ph. T. I. 20.7.39) :-
Ionization of atoms by nuclear reactions.
- 9,11 1283-93 : I. GUREVICH (Radium Inst. LENINGRAD 16.8.39) :-
On the properties of the energy-spectrum of heavy nuclei, with ref. to work with M. MESHCHERIAKOV : Soviet Physik 13 (1938)151.
- 1940
10,1 5-14 : A. MIGDAL (L. Ph. T. I. 25.10.39) :-
Scattering of neutrons on paramagnetics.
- 29-36 : Ya. B. ZELDOVICH & Ya. B. KHARITON (LEN. Inst. for Chem. Phys. 22.10.39) :-
On chain disintegration of uranium under action of slow neutrons. ackn. to I. I. GUREVICH, I. V. KURCHATOV, I. Ya. POMERANCHUK.

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1940

10,1

37-39 : G. Ya. SHCHEPKIN & L. M. KHROMCHENKO (L. Ph. T. I. 25.10.39):-
On methods for the investigation of the scattering
of alpha-particles in gases. (work in Lab. of
I. V. KURCHATOV).

10,2

129-38 : S. RYZHANOV (BAKU 7.8.39) :-
Interaction of barytrons in the electro-magnetic
field in the presence of heavy particles.

155-60 : V. S. GOTT, M. I. KORSUNSKI, F. F. LANGE (KHARKOV, Super-
High Tension Laboratory Ac. Sc. USSR 7.12.39)
Strong ionic currents.

10,4

361-75 : Ya. I. FRENKEL (L. Ph. T. I. 20.2.40) :-
On the spectroscopy of atomic nuclei. (cf. 9,6 641-53)

376-78 : T. A. GOLOBORODKO (KHARKOV, Inst. for Machine
Construction 3.12.39) :-
Scattering Rn - Be photo-neutrons on nuclei of
heavy elements.

379-82 : A. P. GRINBERG (L. Ph. T. I. 14.2.40) :-
Transition scheme of isomeric nuclei, ackn. L. RUSINOV.

10,5

477-82 : Ya. B. ZELDOVICH & Yu. B. KHARITON (L. Ph. T. I. 7.3.40)
Kinetics of chain disintegration of uranium.

10,6

584-88 : D. V. TIMOSHUK (Ukr. Ph. T. I. 31.3.40) :-
Width of nuclear level of Ag 22"; E = 3 ev.
ackn. to A. I. LEIPUNSKI.

10,8

835-37 : T. A. GOLOBORODKO (KHARKOV, I. for Machine Const. 1.6.40).-
Angular distribution of photo-neutrons (RaTh + Be)
ackn. to A. I. LEIPUNSKI.

10,9-10

980-84 : A. I. LEIPUNSKI (Ukr. Ph. T. I. 5.7.40) :-
Scattering of photo-neutrons on nuclei.

985-95 : A. I. ALIKHANOV & G. D. LATYSHEV (L. Ph. T. I. 27.7.40) :-
Spectrum of positrons from RaC.

996-006: G. D. LATYSHEV, A. S. KOMPANETS, N. P. BORISOV, I. M. GUSAK
(Ukr. Ph. T. I. 27.7.40) :-
Energy spectrum of RaC gamma-rays, with ref to
ALIKHANOV & DZHELEPOV : Doklady 20(1938)113 &
ackn. to ALIKHANOV.

1007-12 : L. LANDAU (Inst. Phys. Problems 5.7.40) :-
Angular distribution of particles in C. R. showers. (Theory

1013-17 : K. A. PETRZHAK & G. N. FLEROV (9.7.40) :-
Spontaneous fission of uranium. ackn to I. V. KURCHATOV.
/Note : One of fundamental discoveries; giving a
half-life of 10^{14} years; confirmed much later in W/

1018-24 : A. P. GRINBERG & L. I. RUSINOV (L. Ph. T. I. 5.7.40) :-
Structure of low excitation levels of Br⁸⁰ nucleus.
ackn. to I. V. KURCHATOV.

1080-86 : M. I. KORSUNSKI & S. T. SHARLO (Ukr. Ph. T. I. 9.7.40) :-
Strong ionic currents. ackn. to F. F. LANGE & V. KELMAN.

1172-74 : M. G. VESELOV & M. I. PETRZHAK (Ukr. Ph. T. I. 29.6.40) :-
Lithium atom.

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- 10,12 1311-38 : M. MARKOV (8.7.40) :-
On the 4-dimensionally extended electron in relativistic quantum Theory.
/Note : This paper has recently become of great importance, when YUKAWA attempted to develop a non-localized theory of the electron with the aim to avoid certain divergence difficulties./
- 1339-41 : A. SOKOLOV (SVERDLOVSK St. University 27.7.40) :-
Quantum Theory of meson scattering. ackn to D. IVANENKO. ①
- 1941
11,1 43-59 : A. V. IVANOV, A. K. VALTER, K. D. SINELNIKOV, A. Ya. TARANOV, A. M. ABRAMOVICH (Ukr. Ph. T. I. 26.7.40) :-
Investigation of electron "Bremsstrahlung" by a calorimetric method.
- 96-100 : Ya. P. TERLETSKI (MOSCOW St. University 16.2.40) :-
Relativistic movement of electrons in variable magnetic field.
/Note : Theory of betatron ;)
- 11,2-3 197-99 : D. IVANENKO (SVERDLOVSK St. Univ. 20.7.40) :-
Notes on meson-theory. ①
- 200-06 : G. D. LATYSHEV & L. A. KULTACHITSKI (Ukr. Ph. T. I. 15.11.40) :-
Spectrum of recoil electrons from gamma-rays of active Th.-deposits.
- 207-12 : A. MIGDAL (L. Ph. T. I. & Inst. Phys. Problems M. 18.11.40) :-
Ionization of atoms by alpha- & beta-decay. ackn. to LANDAU.
- 213-21 : G. S. ZAVELICH (L. Ph. T. I. 6.12.40) :-
Internal conversion on L - shell at low nuclear excitations. Ackn. A. B. MIGDAL, L. I. RUSINOV, A. P. GRINBERG.
- 377-81 : V. RUDNITSKI : (SVERDLOVSK, Urals Branch Ac. Sc. 5.10.40) ②
Electrons & neutrinos in the meson field;
transformation of elementary particle.

Journal of Technical Physics.

- 1938
8,11 985-93 : K. D. SINELNIKOV, A. K. VALTER, A. Ya. TARANOV, V. A. PETUKHOV, V. S. GUMENIUK (Ukr. Ph. T. I. 22.3.38)
Three million Volt tube.
- 8,21 1908-22 : K. D. SINELNIKOV, A. K. VALTER, V. S. GUMENIUK, A. Ya. TARANOV (Ukr. Ph. T. I. 31.7.38)
Vacuum Technique.
- 1939
9,15 1345-56 : A. S. ZINGERMAN & M. I. KORSUNSKI (LEN. Industry Inst. 20.4.39)
Tube discharge at high vacuum; tension 2.5 Million Volt.
- 9,18 1683-86 : I. E. BABYGIN (LEN. Industry Inst.)
Impulse-generator for medium tension. (1.2 million Volt)

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- 9,20 1879-82 : L.M.NEMENOV & A.S.FEDINRKO (L.Ph.T.I. 3.7.39) :-
Mass-spectrograph.
- 9,23 2071-80 : A.F.JOFFE (L.Ph.T.I.4.10.39) :-
Electro-static generator in collaboration with
S.A.BOBKOVSKI, B.M.GOKHBERG, N.M.REINOV, L.ARTSIMOVICH,
G.Ya.SHCHEPKIN.
- 2081-89 : B.M.GOKHBERG, A.F.JOFFE, N.M.REINOV (L.Ph.T.I.4.10.39):-
& Models of electro-static generators (100-180 KV)
2094-103 (KV = 1000 volt)
- 2090-93 : S.A.BOBKOVSKI, B.M.GOKHBERG, A.F.JOFFE, N.M.REINOV,
(L.Ph.T.I. 4.10.39) :-
High-tension electro-static generator 1.6 MV. with
ackn. to L.A.ARTSIMOVICH & G.Ya.SHCHEPKIN.
- 1940
10,3 177-98 : B.M.GOKHBERG (LENINGRAD 26.12.39) :-
High-tension electro-static generators, reporting
Ukr. Ph.T.I. KHARKOV 4 MV in 1936-37, L.Ph.T.I.
200 KV, but n/c 700 KV.
- 10,17 1404-25 : S.A.BOBKOVSKI (16.5.40) :-
General Theory of electro-static generators.

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Vestnik Ac.Sc.No 3 (1946)

In Vestnik Ac.Sc.No 3 (1946) 70-73 is published a report
read by A.F.JOFFE on 15.1.46 on the work of the Math.Ph.
Section Ac.Sc.during 1942-45.

The following subjects were dealt with in the various institutes:

- Inst.Ph.Problems : 1) Low Temperature Physics
2) Mass production of liquid oxygen
organised.
- Lebedev Inst. : Atomic Nucleus, Cosmic Radiation;
Physical optics, Non-linear vibrations;
Radio-physics, Acoustics,
Dielectrics, Theoretical physics.
- Phys.Techn.Inst. : Semi-conductors,
Electronic emission of solids,
High molecular compounds,
Atomic Nucleus, Cosmic Radiation
Physics of solids.

In this report as well as in a previous one, on 20.2.45,
on the work of the Institutes of the Math.Ph.Section Ac.Sc.
during 1944 (cf. Izv.(Ph.)9(1945)259-265, JOFFE mentions a
further number of institutes, laboratories, commissions etc.

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10th September 1952

U. S. OFFICIALS ONLY Attachment 2U. S. S. R.ScientificBooks on Mathematics, Physics, and Related Subjects.
August 1952

1. A number of textbooks & monographs on mathematics, physics, & related subjects have come to our attention. Although these books represent a rather haphazard selection, they nevertheless may allow - together with other publications, reviews, etc... - a certain insight on the state of Soviet higher education & scientific training.

We shall refrain here from presenting a detailed analysis of these individual publications, - this may be supplied if desired - & try to summarize briefly our impressions & conclusions.

2. To get a just appreciation one has to consider the trend of development, the aims, the achievements & the situation in other countries.

Original publications have their periods of ups & downs & the well-known campaign against so-called bourgeois science together with far fetched priority claims has discredited the Soviets; but the more one sees of the ordinary, regular work, both in research & in teaching, the more one is impressed by the solid standard.

3. Original research in Physics, as far as accessible to us in papers published in the "Doklady" & "Izvestia" of the Academy of Sciences or in the "Journal of Experimental & Theoretical Physics", the "Journal of Technical Physics", the "Astronomical Journal" seems to show a certain decline even if wartime & post-war difficulties & the ever increasing security check on publications are taken into account. During 1947 foreign language scientific editions or resumes were suspended & publications in Russia declined in topicality & quality. This went so far that all references to existing Russian cyclotrons, synchrotrons, etc. previously mentioned with pride, completely stopped & even in popular science books only foreign (American) instruments were mentioned & shown in picture.

4. We should not disparage the Russians or draw too hasty conclusions because of this over-emphasis on secrecy. There always have been at least some papers on difficult & important subjects pointing out new relevant aspects or methods thus showing that highly qualified scientists were not lacking. The Soviets have also repeatedly & clearly stated that solutions of certain problems could not be expected soon, (SKOBELTSYN, VERNOV : re. meson theories; A.M. MARKOV, BLOKHINTSEV : re. generalised quantum theory; etc..) giving proof of critical judgement & of a certain modesty.

In Mathematics, further from direct practical application, the standard always remained high.

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5. Other countries also have proved somewhat disappointing. In France, for instance, the decline which started before the war seems to continue; elsewhere the publication of astonishing original wartime research has not been followed up (HEISENBERG's S-matrix theory in Germany, TOMONAGA's super-many-time quantum field in Japan). Certain high hopes connected with the two above mentioned developments & continued by SCHWINGER, FEYNMAN, DYSON, e.a. have not materialised and the best result is a sober analysis of all the existing troubles : PAIS , UHLENBECK & DYSON in Physical Review : Some Russian warnings, e.g. by MARKOV, proved correct.
6. The Russians certainly have a number of outstanding mathematicians & physicists but most of the best known belong to the old generation and their work lies in the past : e.g.
 → the mathematicians BERNSTEIN, KELDYSH, VINOGRADOV e.a., the physicist JOFFE, the late PRENKEL, LANDAU e.a. Men of a younger generation, in their forties, like GELFAND (math.), BLOKHINTSEV (phys.) have won international fame.
 There are a number of outstanding papers by younger men but it is impossible to assess the real worth of these authors. Is this not the same in other countries ?
7. The textbooks will give an idea of the aimed-at standard of training and education as well as of the existing methods & means. The last 2 or 3 years have brought a wealth of monographs & textbooks or new editions of them, in addition to a considerable number of translations of foreign books. At a recent "Algebra" conference there still were complaints of lack of suitable books.
 With the year 1952, a number of Russian periodicals suddenly showed a higher standard in paper, print and contents; this was especially striking in "Priroda" & in the "Journal of Experimental & Theoretical Physics". References to foreign publications has markedly lost aggressiveness & stresses agreements. A new more civilised etape has started.
8. These translations do not mean a scarcity of Russian books. For example A.J. MARKUSHEVICH : Theory of Analytical Functions is a very good book. Its one fault is that it goes too far; the beautiful lucidity & conciseness of TITCHMARSH is lacking in this "thorough" book.
 COURANT & HILBERT (Methoden der Math. Physik), just as WHITTAKER & WATSON (Modern Analysis 1927 & still reprinted-translated earlier) are reference books, complete & perfect in themselves which have become international classics & used as such all over the world, where new writing would be waste of time.
 The translation of such a number of specialized monographs may indicate lack of knowledge of foreign languages but it also shows the eagerness to learn & to provide the student with the best material.
 Einar HILLE (just made a Member of the Swedish Royal Academy) in his Functional Analysis & Semi-groups often refers to & builds up on Soviet work - at least a quarter of the references, & the most fundamental ones, are on recent Russian publications.

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9. The "Course of Higher Mathematics" in five volumes by V.I. SMIRNOV (Stalin Prize 1st class) is interesting. This could cover - but certainly exceeds the mathematical syllabus for Universities. For details see Bibliography, page 16; we will only stress here the fact that volume V (not available to us) contains functional analysis, a field of mathematics at present not yet belonging to the mathematical syllabus of other countries.
- This & other textbooks show a danger in offering too much material to the student.
10. "Progress of Mathematics" VII,2 (1952) 206-214 has opened a discussion on the "Course of Mathematical Analysis" by Prof. BERMANT where the reviewer G.P. TOLSTOV stresses the difficulty of teaching the engineer advanced subjects without overburdening him too much. Enumerating a number of minor defects he pleads for acceptance "faute de mieux" and it has become an official textbook for Technical Institutes. (we perfectly agree with this appreciation).
- This case proves that there is a serious endeavour to provide the best material & at the same time show that heavy criticism is possible without damaging results.
- The affair of the "varitrons" of ALIKAHNOV e.a. goes even further : we see repeated rude attacks against a Stalin Laureate, & yet nothing happens.
11. It is significant that textbooks written by the very best Russian scientists (e.g. GELFAND for algebra, PETROVSKI for analysis) are relatively short; they are so lucid that they appear simple though dealing with or preparing for very advanced subjects; they certainly should create a clear understanding of the essential ideas. Although their authors are known for their original work all stress is laid on presentation for the benefit of the student.
- Other books (e.g. MARKUSHEVICH) get somewhat lost in details or seem over ambitious (e.g. MALTSEV).
12. The Soviets care so much for a lively presentation - their semi-scientific books are often models of correct & inspiring presentation - that one wonders to find as official textbooks such rather dull compilations as SHPOLSKI's "Atomic Physics" or FRISH & TIMOVEVA's "Course of Higher Physics". There is nothing really wrong, they are just uninspiring and lack a great conception. (R.W. POHL : "Einführung in die Physik" would have given a good model)
- Books of technical & secondary schools are much more alive.
13. A considerable number of monographs have been published either systematizing research in an important field (GERONIMUS, KANTOROVICH e.a. PONTRYAGIN) or somewhat shorter ones on original work mainly by the author himself (MIKELADZE, MYSHKIS, PEKAR) . They correspond to Cambridge monographs & tracts or to the various Princeton series. Some have already won international fame like PONTRYAGIN, KANTOROVICH.
- In functional analysis & topology the Russians are leading equalled only by the Americans.
14. One must not forget that the books reviewed here form only an apparently small part of the existing publications. For example in addition to the books on theory of functions (MARKUSHEVICH, NATANSON) mentioned in the attached Bibliography we know of a number not available to us such as :-

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- I.I. PRIVALOV : "Introduction into the Theory of Functions of a Complex Variable", 7th ed. 1945;
- B.A. FUCHS & B.B. SHABAT : "Functions of a Complex Variable & their Applications", 1949;
- S.A. YANCHEVSKI : "Functions of a Complex Variable", 2nd ed. 1947;
- M.A. LAVRENTIEV : "Conformal Representation & its Application to Problems of Mechanics", 1947;
- I.I. PRIVALOV : "Boundary Properties of Analytic Functions", 1950;
- G.M. GOLUZIN : "Conformal Representation of Simply & Multiply-connected Domains", 1937;
- P.S. ALEKSANDROV : "Introduction into the Theory of Sets & the Theory of Functions", 1950
- A.N. KOLMOGOROV

There are also a number of translations as shown in Bibliography: CARATHEODORY, MORSE, TITCHMARSH, e.a.

15. The everchanging field of Technique may be doubtful. The few books we had the opportunity to study are good & as a rule of a higher intellectual level than many books in the West where too often a "Pitman" routine standard prevails. (cf. GORELIK, KAPTSOV, VEKSLER, e.a.) SOKOLOVSKI's monographs on Plasticity are excellent, nothing similar seems to exist in the West.

On the other hand the quick & open publication of technical advances appears to be handicapped and should produce a delaying & paralysing effect, not to be balanced even by the very best background training.

The technical books of less high level read & look like American books (e.g. GRIGORIEV).

16. Security reasons all over the world hamper the production of good up to date books in many fields, e.g. aerodynamics. Russian books are good & appropriate to various purposes although slightly antiquated.

In Nuclear Physics, AKHIEZER & POMERANCHUK are dated; KORSUNSKI is quite disappointing.

To make sure they cannot divulge anything the Russians prefer translating & publicising 2nd rate American & German books (see para 3).

There was a special conference on "Electron Microscopy", but as a rule one hears little of the 100 or more electron microscopes working in RUSSIA.

17. Some authors should be mentioned as representing the best & typical Russian way of thinking. KOLMOGOROV, KHINCHIN, the late N.S. KRYLOV : a combination of penetrating logic with a gift for practical application; a comprehensive philosophic viewpoint & the skill to master the details subordinating them to the essential idea. The late FRENKEL, LANDAU (cf his Field Theory) have a knack to make most involved affairs intelligible; & something of this is seen even in books on technical subjects.

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18. Generally speaking the standard of the reviewed books is high, the training should be good & the syllabus for mathematics & physics becomes more & more exacting.

Doctoral dissertations have not been available, although one could find a number of them published in the Publications of the Lebedev Institute (not available to us)

In mathematics the work done by members of Pedagogical Institutes proves the existence of a sufficient number of good scientists; there are also able physicists at these Institutes.

The language handicap will be partly overcome by a great number of well chosen translations. the fact that so many first rate scientists can be spared for astrophysics, for rather abstract branches of mathematics indicates a certain freedom of research.

The sobreness & honesty of presentation should be stressed in contrast to certain extravagances in press publications & reported priority claims; but no good can come from the exaggerated security measures.

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BIBLIOGRAPHY

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1. A. AKHIEZER & I. Ya. POMERANCHUK

"Some Problems of Nuclear Theory"

416 pages, R.15.25
 2nd ed. 1950, 1st ed. 1948
 5,000 copies

The book contains useful material, concisely but clearly presented. It does not pretend to be more than a compilation, does not claim any unusual Russian priorities and does not touch any controversial points of fundamental or philosophical importance.

The book is good, but not interesting.

2. A. D. ALEKSANDROV

"Intrinsic Geometry of Convex Surfaces"

387 pages, R.26
 1948
 6,000 copies

A monograph systematising work of CESARO, MINKOWSKI, BLASCHKE, e.a. combined with ideas of topology, variational calculus in the large etc... as developed by M. MORSE, LUSTERNIK, e.a.; in such completeness unique. The award of the Lobatchevski Prize is well deserved.

This is not a subject suitable for immediate practical application.

3. A. I. BACHINSKI (died) & S. M. ILYASHENKO

"Textbook for Artisan Railway & Mining Schools and for Self-study"

543 pages, R.13.50 reduced to R.12.15
 4th edition 1952
 40,000 copies

The book is very alive and treats clearly ideas from many aspects; the 645 illustrations are simple drawings, but instructive and often amusing.

4. Professor A. F. BERMANT

"Course of Mathematical Analysis"

I 564 pages, R.16.30
 6th ed. 1951, 25,000-50,000 copies

II 443 pages, R.13.30
 4th ed. 1951, 25,000-40,000 copies

Official textbook for Higher Technical
 Teaching Institutes.

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CONTROL U. S. OFFICIALS ONLYProfessor A. F. BERMANT (contd.)

The present edition of the textbook was considerably revised to satisfy the demands of the new program (1950) of the Ministry of Higher Education for Higher Technical Institutes.

Similar books exist in other countries.

N. P. TARASOV has written an even simpler book :-

"Course of Higher Mathematics for Technicians"
356 pages, R. 8.75
1951, 50,000 copies

5. a D. I. BLOKHINTSEV

"Acoustics of a Heterogeneous Moving Medium"

Lebedev Institute
220 pages, 1946

Though the book does not aim at completeness, the author has ventured on a few theoretically interesting problems of future research.

Experimental material is mentioned only for purposes of illustration.

BLOKHINTSEV from the start treats the problem in great generality and develops equations for a medium with locally variable entropy with turbulence in linearized form.

Note : - Such problems are as yet not treated elsewhere. cf. von WEIZSACKER

5. b

"Quantum Mechanics"

588 pages, R. 17.50
2nd ed. 1949, 1st ed. 1944

Stalin Prize 1st cl. for 1950

A good book indeed, to compare with SCHIFF :
"Quantum Mechanics."

6. G. P. BOEV

"Theory of Probability"

Saratov University
Textbook for higher educational Institutes
1950, 15,000 copies

Reviewed by A. KOLMOGOROV in Progress of Mathematics VI, 3(1951) 175-81 who sums up :

"Interesting subjects, but carelessly written..... an interesting and very promising first draft of a future good book.....if 15,000 copies hadn't already been published."

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7. V.F. BOLOTNIKOV"Elementary Course of Aircraft Aerodynamics"

400 pages, R.16
 2nd ed. 1950, 1st ed. 1945
 State Publication
 For readers without knowledge of higher
 mathematics; including high speed, jet aircraft.

Appropriate for the purpose.

8. V.N. FADDEEVA"Numerical Methods in Linear Algebra"

250 pages, R.9.85
 1950, 5,000 copies

Reviewed by D.P. GROSSMANN, Progress of Mathematics
 VII,1(1952) 211-15
 Useful for technical applications.
 Brings much original Russian work on iteration
 methods, eigen-values etc. Should be compared
 with the translated book V.E. MILNE :
 "Numerical Analysis" 1951.

9. N. Ya. FABRIKANT"Aerodynamics "

Part I 624 pages, R.18.15
 1949, 7,000 copies

Part II On boundary layer problems etc.
 not yet available.

The course is intended for engineers, therefore
 close connection exists between experiment, theory
 and practice.

10. Ya. I. FRENKEL"Statistical Physics"

2nd ed. 1948, (1st ed. 1932)
 2 volumes : Wave mechanics,
 Kinetic theory of liquids.

Well known translation.
 The lucidity of the presentation is an example
 for all research publications.

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SECRET**CONTROL U. S. OFFICIALS ONLY**11. S.E. FRISH & A.V. TIMOYEVA**"Course of Higher Physics"**(officially admitted for Physical & Phys.-
Technical Faculties of State Universities)vol. I 514 pages, R.13.50
3rd ed. 1951, 75,000 copiesPhysical foundations of mechanics.
Molecular physics.
Oscillations and waves.vol. II 591 pages, R.13.85
2nd ed. 1949, 50,000 copies

Electric & electromagnetic phenomena.

vol. III 796 pages, R.17.40
1st ed (?) 1951 75,000 copies

Optics, atomic physics.

On usual lines, rather dull; lots of details:
e.g. standing waves/colour photography.12. I.M. GELFAND**"Lectures on Linear Algebra"**Lectures at the MOSCOW State University (Mechanics-
Mathematics Section) & at the Belorussian State Un.252 pages, R.10.30
2nd ed. 1951 (1st ed. 1948)A concise and clear presentation but scarcely
anything original; an ordinary university course,
but sufficient preparation for the study of the
representation of groups, especially rotation groups
and spinor representations, playing such an important
role in Quantum Mechanics.

No references, no bibliography.

13. Ya.L. GERONIMUS**"Theory of Orthogonal Polynomials"**

164 pages, 1950

Reviewed by V.L. GRUCHAROV in Progress of Mathematics
VI,2 (1951) 203-204A monograph on a central problem of the modern
theory of functions, based on many works of
N.I. AKHIEZER, BERNSTEIN, KREIN, NATANSON,
D. JACKSON & the author himself.

A similar monograph is lacking in the West.

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14. A. L. GORELIK

"Industrial Electronics"

383 pages, R.18.60
1951

Lectures : KHARKOV Polytechn.Inst.i/n LENIN

The book makes no claims of original research, but it appears to be an excellent textbook, expounding clearly the basic ideas and features of electronics and the working characteristics of the various classes of devices; the drawings give very neat schemas,

This classifying and working-out of the comparative characteristics make the book very intelligible - details of construction are left out.

15. G. S. GORELIK Professor GORKI State University.

"Oscillations and Waves"

551 pages, R.33.25
1950

Introduction to acoustics, radiophysics, optics for students of physics, technical physics and radiotechnics.

Lectures: GORKI University.

The book contains no bibliography; it is a straightforward textbook with no claims of original research or priority. The method of treatment associating experiment & theory and combining various fields of physics from one central aspect will lead the pupil to do his own thinking. The method is not new, but it is so well done & worked out here that it may set an example.

16. V. S. & B. S. GRIGORIEV

"Electronic & Ionic Devices"

328 pages, R.10.50
1950

No priority claims are made except in the introduction, and there are scarcely any indications of independent modern Russian development.

It could be an American book or a Pittman edition but the Russian text seems better suited for real understanding, Pittman books give rather more routine knowledge.

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17. D. IVANENKO & A. SOKOLOV

"Classical Field Theory" (new Problems)

479 pages, R.11.20
2nd ed. 1951 10,000 copies

432 pages, R.16.60
1st ed. 1949 5,000 copies

The authors were awarded a Stalin Prize 2nd class for research work interpretation in this book.

As intended by the authors, the book may well serve as a supplement to an ordinary course of classical field theory and furthermore as an introduction to the modern theory of the elementary particle, the main problem of the latest investigations in Quantum Mechanics.

It is strange to note that no hint is given of the existence of electronic accelerators in Russia, though important Soviet contributions to their theory (synchrotron, betatron) are expounded.

18. I. L. KAGANOV Professor Dr. Techn. Sc.

"Electronic & Ionic Devices"
(Foundations of Industrial Electronics)

I Electronic Technique
(textbook for Energetics & Electronics
Institutes.)

664 pages, R.22
State Energetics Publ. 1950, 10,000 copies.

Bibliography : 78 numbers almost all Russian
Quite a good book; stress laid on understanding -
but not outstanding.

19a. L. V. KANTOROVICH

"Theory of Probability"
(for Military-Engineer Colleges)

152 pages, 1946

It is interesting to note that a man with KANTOROVICH's gifts writes such semi-popular books.

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19b. L.V.KANTOROVICH & V.I.KRYLOV (died 21.6.47)

"Approximation Methods in Higher Analysis"

696 pages, R.20
3rd ed. 1950, (1st ed. 1936) 10,000 copies

A high mathematical standard & demanding a good deal of mathematical knowledge; certainly extremely useful for applied physics & higher engineering problems. Such a book would be useful in the West.

19c. L.V.KANTOROVICH, B.Z.VULIKH, A.G.PINSKER

"Functional Analysis in semi-ordered spaces"

1950

First monograph on a new mathematical concept : theory of linear semi-ordered spaces and the operations there.

First ideas to be found in :-

V.I.GLIVENKO : Théorie générale des structures (1938)

G.BIRKHOFF : Lattice Theory 1940 (2nd ed. 1949)

20. N.A.KAPTSOV

"Electrical Phenomena in Gases & in the Vacuum"

836 pages, R.22
2nd ed. 1950
Sc.Research Institute for Physics
Moscow State University

Nov. 1945 Preface 1st ed.
July 1950 Preface 2nd ed.

The book does not make any claim of originality, nor are there professed any undue claims of Russian priority though occasionally minor achievements are stressed; e.g. NEIMAN, B.R.& N.I.LAZARENKO (688 p.) V.N.CHIKOLEV (703 p.), Stalin Prize 2nd class.

A well written comprehensive handbook; the theoretical background is extremely well treated & allows an understanding & fruitful application of experimental phenomena which are clearly described and illustrated by simple but characteristic drawings. Condensed but clear. The standard is higher than usual in technical books.

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SECRET CONTROL U. S. OFFICIALS ONE21. A. Ya. KHINCHIN**"Mathematical Foundations of
Statistical Mechanics"**

This book has been translated by G. GAMOV in USA
VIII + 179 pages 1949.

It shows a penetrating logic.

One must agree with the American statement that this
book offers a precise and mathematically satisfactory
formulation of the problems of statistical mechanics;
in contrast to the non vigorous discussion presented
in most other works.....

Other books of this author : "Mathematical Foundations
of Quantum Statistics" 1950 and "On the Analytical
Apparatus of Statistical Physics" 1950 are not
available to us.

Another extremely interesting Russian work in this
field has also been translated in USA :

A. N. KOLMOGOROV, "Foundations of the Theory of
Probability" NEW YORK 1950, VIII & 70 pages,
original publication 1933.

22. N. E. KOCHIN**"Vector Calculus & Elements of Tensor Calculus"**

426 pages, R.20

7th ed. (Ac.Sc.publ.) 1951, 10,000 copies

(not to be confused with P. Ya. KOCHINA C.M.Ac.Sc.)

In bibliography no references to original publications;
an excellent textbook; the 140 pages devoted to
affine orthogonal tensors and to the general theory
of tensors (leading up to the Riemann-Christoffel
tensor) provide a clear understanding and just the
right amount of knowledge for the theoretical
physicist.

23. A. N. KOLMOGOROV**"Foundations of the Theory of Probability"**

Originally published under the title : "Grund
begriffe der Wahrscheinlichkeitsrechnung" in the
Ergebnisse der Mathematik 1933, published in Russian
under the present title 1936

American translation NEW YORK 1950 VIII + 71 pages

This little book has become a "classic" & is of
fundamental importance. The author was influenced
by the analogies between measure of a set & probability
of an event between integral of a function and
mathematical expectation of a random variable.
He has extended these ideas for an axiomatic found.
he has then developed especially the probability
distributions in infinite-dimensional spaces;

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23. A. N. KOLMOGOROV (contd.)

differentiation and integration of mathematical expectations with respect to a parameter; the theory of conditional probabilities and conditional expectations; he surveys the applicability of the ordinary and of the strong law of large numbers. This little monograph shows in easily accessible form the typical qualities of good Russian work.

24. M. I. KORSUNSKI

"Atoms & Nucleus"

358 pages + 27 tables (photos)

No bibliography; elements 1-96.

Very simple, clearly written, no propaganda, no polemics.

Figures, sketches, photos taken from American publications. Betatron for 10^8 ev fig. 37 p. 189 from Westendorp & Charlton: J. of Applied Physics 16 (1945) 581, the General Electric Co's 100 mev betatron.

25. N. S. KRYLOV

"Foundations of Statistical Physics"

207 pages

Ac.Sc. USSR 1950

ed.: V.A. FOK

introduction : A.B. MIGDAL & V.A. FOK (5-14)

Nikolai Sergievich KRYLOV 10.8.17-21.6.47, cf. Nature LONDON (10.6.44) 709 : Relaxation processes in Statistical Physics.

The young author had outstanding logical capacities: the book deserves study.

26. A. G. KUROSH

"Course of Higher Algebra"

335 pages, R.10.90

1st ed. 1946, 2nd ed. 1949, 3rd ed. 1952.

15,000 copies

Official textbook for Univ. & Pedag. Inst.

He write : " The task of Algebra is the study of manifolds where algebraic operations are defined and the properties of these operations. Various branches of Algebra are characterized by the operations which are defined in the manifolds specified, by the way these operations are interconnected, and which are the properties (serving as object for study) to be

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26. A. G. KUROSH (contd.)

DELAUNEY (DELONE) compares KUROSH with van der WAERDEN. KUROSH's book is much more elementary than van der WAERDEN's, an introduction only. KUROSH has done original work cf. Izv. (M) 5(41) 233-47;: Problems of the theory of rings linked with the Burnside problem of periodic groups; Math. Sb. 20(47) 239-62 : Non-associative free algebra and free products of algebra. For material not included see MALTSEV : Foundations of linear algebra, or GELFAND : Lectures on linear algebra.

27. L. LANDAU & E. LIFSHITZ

"Course in Theoretical Physics"
publ. by the Inst. of Physical Problems

Part I	Mechanics
Part II	Statistical Physics
Part III	Mechanics of Continua
Part IV	Field theory
Part V	Quantum Mechanics
Part VI	Macro-electrodynamics
Part VII	Phys. Kinetics

The available volumes correspond to expectation; special attention may be drawn to the volume containing "The Classical Theory of Fields", it has been translated in USA 1951 and well deserves the epithet "admirable" used in the review Nature (LONDON.)

28. M. A. LAVRENTIEV & B. V. SHABAT

"Methods of the Theory of Functions of
a Complex Variable"

606 pages, R. 17.70

for students of mechanics at the Math-Mech.
Faculties & the Phys. & Math.-Phys. Faculties
of the State Universities.
Ministry of Higher Education.

The book is indeed written more simply than textbooks for Mathematicians omitting set-theoretical considerations and going straight to geometrical representations and transformations.

The book is clearly written with an eye on application for special problems; it certainly gives a solid mathematical foundation. It is in no way a collection of ready-made formulae or an easy road to simple applications as are so many books of "Engineering" mathematics

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SECRET**CONTROL U. S. OFFICIALS ONLY**29. L.G. LOITSIANSKI

"Mechanics of Liquids and Gases"

676 pages. R.30.75
1950

Lectures : LENINGRAD Polytechnic Institute

A good textbook, very thorough and well preparing the student for original work of his own. The numerous bibliographical references refer mainly to Russian work but it cannot be said that undue claims of priority are made, the references are intended to facilitate further special study.

30. L.A. LUSTERNIK & V.I. SOBOLEV

"Elements of Functional Analysis"

360 pages, R.14.10
1951, 6,000 copies

Kind of first textbook, based on article of L.A. LUSTERNIK in Progress of Mathematics I (1936): "Fundamental Notions of Functional Analysis" and "Lectures" of V.I. SOBOLEV at VORONOV State University.

It would be desirable to have such a book in the West; the few existing books (e.g. K.O. FRIEDRICHS : "Functional Analysis and Applications," NEW YORK Univ. 1951) are not much good. See also S.L. SOBOLEV : "Applications of Functional Analysis to Math. Phys." LENINGRAD State Univ. 1950 and L.V. KANTOROVICH : "Functional Analysis and Applied Mathematics" Progress of Mathematics III, 6 (1948). (not available to us.)

31. A.I. MALTSEV

"Principles of Linear Algebra"

432 pages, R.17.50
1948, 8,000 copies.

Lectures (expanded) given at St. Pedag. Inst. IVANOV; ackn. to Prof. A.G. KUROSH and to Prof. A.I. PLESNER.

The book is written in a very simple and clear way; nevertheless it goes far beyond what may be taught at a Pedagogical Institute and even beyond what is usually taught in a University honour course. This is achieved in the 400 pages by thoughtful presentation right from the beginning.

Most of the pertinent books have been translated into Russian especially the standard books of Elie CARTAN: "Theorie des Spineurs"; M. BOCHER: "Introduction to Higher Algebra"; H. WEYL: "Classical Groups" (Princeton 1947); B.L. VAN DER WAERDEN: "Modern Algebra I & II". I.M. GELFAND's book: "Lectures on Linear Algebra".

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32. A. A. MARKOV

"Selected Papers : Theory of Numbers
Theory of Probability."

719 pages, R.32
3,000 copies

ed. by Prof. Yu.V.LINNIK
Publ.by Ac.Sc.USSR "Classics of Science"1951
under the general editorship of the Committee
for the publication of popular-scientific
literature and of the series "Results and
Problems of Modern Science".

The son has written a short biography, LINNIK and a
number of mathematicians have commented on the re-
printed papers. A careful edition, worthy of the
man to be honoured.

33. A. I. MARKUSHEVICH

"Theory of Analytical Functions"

704 pages, R.29
1950 15,000 copies

Admitted as textbook for Higher Teaching Inst.

The book is an expanded version of lectures held at
the MOSCOW University.

It is a thorough introduction into the theory of
functions going very much into detail it prepares
well for further study facilitating it by numerous
references to books & original papers.

Not treated are problems necessitating measure theory
and Lebesgue integration (which are included for
example in the much smaller English book by
TITCHMARSH).

Reference is made instead to I.I.PRIVALOV : Boundary
Properties of Single-valued Analytical Functions.

A good introduction is given to meromorphic
functions and to Riemann-surfaces, but for more
thorough study reference is made to NEVANLINNA,
COURANT, CHEBOTAREV.

The book gives an interesting bibliography of
Russian and foreign literature including many
translations.

34. V. MEZENTSEV

"Riddle of the Universe"

142 pages, R.3.10
1951

School library children's literature.

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A good example of popular writing.

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SECRET **CONTROL U. S. OFFICIALS ONLY**35. Sh. E. MIKELADZE

"New Methods for the Integration of Differential Equations and their Application to Problems of the Theory of Electricity."

291 pages, R.11.50

1951

preface dated TIFLIS Oct. 1949

Numerical methods for boundary problems in technical applications.

Rather specialized.

36. I. G. MIKHAILOV

"Diffusion of Ultra-sonic Waves in Liquids"

152 pages, R.5.50

1949

publ. in "Modern Problems of Physics"

ed.: S. I. VAVILOV (died), A. F. JOFFE,

P. LUKIRSKI, V. A. FOK, Ya. I. FRENKEL.

Very simply written, a good introduction to the essential problems though restricted to liquids and amorphous solids - supercooled liquids.

37. A. D. MYSHKIS

"Linear Differential Equations with Retarding Argument"

255 pages, R.8.80

1951

RIGA, Latvian State University

re-written dissertation (1949) in preface

publ. in collection: "Modern Problems of Mathematics".

Too specialized for us to appreciate its value; significant as an example of specialized monographs reporting and original work.

38. I. P. NATANSON

"Theory of Functions of a Real Variable"

400 pages, R.16.40

1950, 10,000 copies

Textbook for Universities.

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38. I. P. NATANSON (contd.)

Treating the theory of measure, Lebesgue integration and leading to some rather specialized problems of functional analysis.

The existing books in the West have become somewhat dated and NATANSON presents a relatively newer outlook.

The last chapter gives an interesting review of the role of Russian & Soviet Mathematicians in this field.

39. A. N. NESMEYANOV

"Marked Atoms"

64 pages, R.1.05
1951, Sc. Popular Bibl. 38

Clever popular story of structure of atom and nucleus, radio-active families, isotopes and their various applications. fig. 10/12, p. 28/30 show drawings of a cyclotron (taken we think from an American publ.) without any reference to Russian work.
No references at all.

40. S. J. PEKAR

"Investigations into the Electronic Theory of Crystals". 1951

In this monograph the author repeats his own investigations based on the notion of "polaron"; his theory seems indeed to lead to better results in certain cases than the ordinary theory of Brillouin zones.

cf. -N. MOTT & R. GURNEY : "Electron Processes in Ionic Crystals" (Russian translation 1950)

-H. FRÜHLICH e.a. Phys. Mag. 41 (1950) 221.

An example of the aim to present quickly systematical presentations of new & still controversial subjects.

41. I. G. PETROVSKI

"Lectures on the Theory of Integral Equations"

127 pages, R.4.50
2nd ed. 1951

Preface to 1st ed. : 28.5.47 Lectures (1946)
MOSCOW State University. Manuscript read by
P. S. ALEKSANDROV, I. M. GELFAND, A. D. MYSHKIS.

Preface to 2nd ed. : 14.2.51 followed by remarks
by I. M. GELFAND, S. KRADKOVSKI, A. MIKHLIN,
A. D. MYSHKIS, O. A. JOLEINIK.

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41. I.G. PETROVSKI (contd.)

This small book shows the care with which textbooks are prepared. Although the author has done important original work and has had the cooperation of a number of excellent mathematicians, the book does not show original solutions, but a very careful and readable presentation of "common goods". For this booklet and similar booklets on differential equations (not available to us) the author, rector of MOSCOW University, was awarded a 2nd class Stalin Prize for 1951 (March 1952). SMIRNOV & BLOKHINTSEV received 1st class Stalin prizes for their books.

42. .PONTRYAGIN

"Topological Groups"

American publication 1946
Russian 1st ed. 1936

This book has been published in USA in the Princeton Mathematical Series and is considered a "classic" in its field.

43. P.Ya. POLUBARINOVA-KOCHINA (C.M.Ac.Sc.) & S.B. FALKOVICH

"Theory of Filtration of Liquids in Porous Media"

Published in "Advances in Applied Mechanics"
edited by R. MISES & Th. von KARMAN
NEW YORK 1951 pp.153-225, with a bibliography
of 197 numbers almost all Russian..

Gives the specialist a reasonable idea of Russian work in this field of applied math. & physics bearing on drainage and in particular oil deposits.

44. E.V. SHPOLSKI

"Atom Physics"

vol I 3rd ed. 1950, 524 pages
Introduction into Atom Physics.

vol II 2nd ed. 1950, 718 pages
The electron-shell of the atom and
the atomic nucleus.

a useful compilation, not more.

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SECRET**-16-
CONTROL U. S. OFFICIALS ONLY**45. V.I. SMIRNOV

"Course of Higher Mathematics"
in 5 volumes.

vol I	12th ed. 1951	472 pages
	R.15.75,	20,000 copies
vol II	10th ed. 1951 (1st ed. 1937)	627 p.
	R.20.	15,000 copies
vol III,1	4th ed. 1949	335 pages
	R.11.20	10,000 copies
vol III,2	5th ed. 1951	676 pages
	R.20.65	10,000 copies
vol IV	2nd ed. 1951	804 pages
	R.23.45	25,000 copies
vol V	not available	

Such a textbook has to proceed more or less on standard lines, and indeed the author makes no attempt to originality nor to claim special Russian achievements. The presentation is simple and clear with well chosen examples; complicated problems, set theoretical arguments are omitted therefore the advance is straight and fast.

The first 2 volumes contain all the material necessary for practical solution of "ordinary" engineering problems and most of theoretical physics. After the treatment of differential and integral calculus the author develops a special chapter to vector analysis and field theory which leads directly to the potential field, to Maxwell's electro-magnetic equations and to the Laplace operator.

The next short chapter gives in vector representation the elements of differential geometry leaving enough space for a sufficiently broad treatment of Fourier series and the main types of differential equations of mathematical physics. Though generally treated from a practical point of view, theoretical questions, problems of single-valuedness, Dirichlet principle are well covered.

The next 2 volumes show a somewhat different, more mathematical character.

Vol. III in its 1st part is devoted to linear algebra and group theory containing features as a rule left to rather specialized lectures or monographs, especially a thorough treatment of the rotation and Lorenz groups preparing for the study of such books as :- Elie CARTAN : Theorie des Spineurs, B.L. van der WAERDEN : Die Gruppen theoretische Methode in der Quanten Mechanik, and L.S. PONTRYAGIN : Topological Groups.

Vol. III part 2 is devoted to the theory of functions. It is unusual only so far as it contains a considerable amount of material for use in mathematical physics; not only special examples such as wave functions, Fresnel integral, the way of treatment of the Stirling formula but also a special chapter on matrix-functions where we find Russian research of I.A. LAPPO-DANILEVSKI is quoted. A chapter on linear differential equations applies the methods of the theory of functions mainly in the usual way to the solution of differential equations though here again some recent Russian original work is quoted : I.A. LAPPO-DANILEVSKI, N.P. ERUGIN, V.W. KHOROSHIKOV.

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SECRET**-17- CONTROL U. S. OFFICIALS ONLY**45. V. I. SMIRNOV (contd.)

Vol. IV presents in the usual way the theory of integral equations, partial differential equations, variational calculus and ends with a rather thorough treatment of boundary problems.

Not only are the problems more complicated, the treatment also is from a higher point of view and a number of references to Russian and international original literature are given.

The reader is led for example to an understanding of the Cauchy-Huyghens problem, which means the problem of causality, though for details the reader has to be referred to the original papers of HADAMARD 1932, HAAR:Acta SZEGED 4,2(1928) and to the treatment by "COURANT & HILBERT" or the more general aspects as treated by A. MYSHKIS:Progress of Mathematics 3,2.

For special problems & integral equations reference is made for example to TITCHMARSH : Introduction into the theory of Fourier integrals (Russian translation 1948), for operator calculus to DOETSCH : Theory and Applications of Laplace transformations and his original papers in Math. Zeitschrift.

Vol. V (not available) treats functional analysis.

No other book of this kind has yet presented such new ideas and aspects.

46. V. V. SOKOLOVSKI

"Theory of Plasticity"

396 pages, R.16.45

2nd ed. 1950 (1st ed. 1946 306 pages) 5,000 copies

Stalin Prize for 1951

There seems to be no equivalent book in the West.

The book appears to contain a considerable amount of original research and is more a handbook than a textbook but the presentation is very condensed.

Though leading to practical application the clear presentation of the basic ideas and methods is emphasized.

A solution in closed form not being possible as a rule much stress is laid on the development of suitable mathematical approximation methods. The particular cases often demand from the start a specific approach, e.g. wedge, making a general theory practically impossible.

cf. -W. PRAGER : Theory of Plasticity (mimeograph)

Providence 1942

-van ITESON : Plasticity in Engineering.

Glasgow 1948

-P. F. NEMENYI : Recent developments in inverse and semi-inverse methods in the mechanics of continua.

Advances in Applied Mechanics

II (1951) 123-151

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47. Pavel Samuilovich URYSON

"Works on Topology and other Domains of Mathematics"

992 pages in 2 volumes, R.19.75 & R.18.65
1951, 3,000 copies
ed. by P.S.ALEKSANDROV
(Technical-Theoretical Literature)

Introduction by P.S.ALEKSANDROV : P.S.URYSON & his place in Mathematics, pp 9-44.
URYSON died too young (1898-1924) a genius whose work is not sufficiently known. Most of his work was originally written in French; some of the papers were published in France (Comptes Rendus), others in Germany (Math.Annalen) and in Poland (Fundamenta Math.) Articles published in foreign language have been translated into Russian for this edition.

48. S.I.VAVILOV

"Micro-structure of light"

198 pages, R.10.
1950

Popular Scientific Literature. Results & Problems of Modern Science.

An example of popularisation, and as such quite good.

49. I.N.VEKUA

"New Methods for the Solution of Elliptical (Differential) Equations.

296 pages, R.14
1948

Preface : "Methods and results of the Theory of Functions of a complex variable penetrate more and more in theoretical and applied branches."

The book is mainly based on original work of the author at the A.M.Razmadze Math.Institute of the Grusinian Ac.Sc. and at the Phys.-Math.Department of the State University i/n Stalin at TIFLIS.

Monograph developing methods useful especially for problems of elasticity.

MUSKHELISHVILI's work has won international appreciation, VEKUA is one of his team.

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50. V.I. VEKSLER, L.GROSHEV, B.ISAEV

"Ionization Methods for Radiation Research"

2nd ed. 1949

At present not available to us, but we remember it as an excellent high level book discussing in a thorough but lucid way the methods, instruments and their tricks.

There is a good but far more simple British book by D.H.WILKINSON : "Ionization Chambers & Counters".

A vast material experience has accumulated in many countries and there are numerous publications on this subject therefore a good theoretical background and a comprehensive critical review are of utmost importance. The Russians have hurried to prepare this.

51. G.B. ZHDANOV

"Rays from the Depth of the World"

2nd ed. 1950

The book, a popular presentation of the story of the Cosmic Rays, is much better than one might expect from the fanciful title.

The author was a member of the Pamir expedition with VEKSLER, LYUBIMOV e.a. (Not to be confused with the better known A.P.ZHDANOV, whose work is often quoted in the text) reports in a very clear way the main steps and results in the research history of the Cosmic Rays.

He stresses - correctly - certain Russian priorities, and omits easily parallel developments outside Russia, but does not fail to mention and acknowledge decisive foreign ideas and inventions.

As in other Russian publications, no mention is made of Russian work on artificially created mesons, though American research work in this direction is mentioned.

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52. "Papers dedicated to A.F. JOFFE for his 70th birthday"

1950, 571 pages.

Main subjects :-

- 1) Mechanical properties of crystals.
- 2) Electrical properties of dielectrics.
- 3) Semi-conductors.

Nothing of particular interest; somewhat disappointing as so often in such cases.

53. "Course of Astrophysics and Stellar Astronomy"

Vol. I, 1951

ed.: A. A. MIKHAILOV;

board of ed.: A. N. DEITCH, V. A. KRAT,
O. A. MELNIKOV, M. S. EIGENSON

authors : V. A. ALBITSKI, V. P. VYAZANITSYN,
A. N. DEITCH, M. S. ZELTSEV,
V. A. KRAT, A. V. MARKOV,
P. V. MEIKLAR, O. A. MELNIKOV,
V. B. NIKONOV, V. V. SOBOLEV,
G. A. SHAIN, V. V. SHARONOV.

591 pages, R. 21.75
3,000 copies.

1st ed. Preface written by members of the Pulkovo Observatory.
1934.

2nd ed. The plan is different and so are the authors.

Vol. I : methods and instruments of astrophysics.

Vol. II : modern data on physics of heavenly objects and
structure of stellar systems.

A useful handbook containing a wealth of information
necessary for practical work, but no original research.
Each chapter has its bibliography : quite international
with no special preference for Russian publications.

54. "30 Years Mechanics (1917-1947)"

1950

ed.: V. Z. VLASOV, V. V. GOLUBEV, N. D. MOISEEV.

A good review of the most important works in specific fields
and of the problems where indeed exist remarkable Russian
contributions. It would need a number of specialists for
critical appreciation. The few articles we were able to study
more closely seemed not ultra-nationalistic.

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SECRET CONTROL U. S. OFFICIALS ONLY55. "Jubilee Report (1947) : 30 Years October Revolution"

700 pages

Subjects treated : I Mathematics
 II Physics including Geophysics & Astronomy
 III Chemistry.

Clearly written for international consumption and therefore
 irreproachable and not too interesting.

56. "List of Translations into Russian"
 (with dates of Russian translations)

M. BOCHER,	Introduction to Higher Algebra.
Elie CARTAN,	Théorie des spineurs.
H. WEYL,	Classical Groups.
B. L. v. der WAERDEN,	Modern Algebra I & II.
Harald BOHR,	Almost Periodic Functions, 1934.
E. GOURSAT,	Cours d'analyse mathématique, 1936.
R. COURANT,	Geometrische Funktionentheorie, 1934.
G. JULIA,	Principes géométriques d'analyse.
P. MONTEL,	Leçons sur les familles normales de fonctions analytiques, 1936.
R. NEVANLINNA,	Eindeutige analytische Funktionen, 1941.
G. POLYA & G. SZEGÖ,	Aufgaben und Probleme der Analysis I. & II, 1937-1938
B. RIEMANN,	Gesammte Werke..
E. T. WHITTAKER & G. N. WATSON,	A Course of Modern Analysis, 1932. Transcendental Functions, 1934.
Ch. HERMITE,	Cours d'analyse, 1936
G. CARATHÉODORY,	Conformal representation, 1934.
G. N. WATSON,	A Treatise on the Theory of Bessel Functions, 1949.
E. C. TITCHMARSH,	Riemann's Zeta-Function, 1947 New English ed. 1951.
L. AHLFORS,	Zur Theorie der Ueberlagerungsflächen, 1939.
A. HURWITZ,	Vorles ueber allgemeine Funktionentheorie und elliptische Funktionen, 1933.
E. LANDAU,	Ausgewählte Kapitel der Funktionentheorie, 1940.
M. MORSE,	Topological Methods in the Theory of a Complex Variable, (Princeton 1947), 1951.
V. E. MILNE,	Numerical Analysis, 1951.
R. FRASER & V. DUNCAN,	Theory of Matrices, 1950.
J. HADAMARD,	La géométrie non-euclidienne et la théorie des fonctions automorphes, 1951.
S. BOCHNER & W. T. MARTIN,	Functions of Several Complex Variables, 1951.
D. HILBERT und S. COHN-VOSSEN,	Auschanliche Geometrie, 1951.
A. SOMMERFELD,	Partielle Differentialgleichungen der Physik, 5
E. KAMKE,	Differentialgleichungen der Physik, 1951.
R. COURANT und D. HILBERT,	Methoden der Math.-Physik I & II, 1951.
E. TITCHMARSH,	Theory of Functions, 1951.
G. HARDY,	Divergent Series, 1951.
Einar HILLE,	Functional Analysis and Semi-groups, 1951. (with forword by KOLMOGOROV)

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Attachment 3

SOVIET ASTRONOMY - COSMOGONY

(Current)

- 1) A high importance is attached in USSR to Astronomy. There certainly is a connection with problems of modern physics such as turbulence (where HEISENBERG, v. WEIZSACKER, CHANDRASEKHAR as well as KOLMOGOROV OBUKHOV ea. have made important contributions) or with Q.M. where the stars can be considered as laboratories for super high pressure & super high temperature phenomena, the theory of the carbon cycle for the energy balance or the application of FERMI-DIRAC statistics for the explanation of the high density of the white dwarfs being the most spectacular achievements. (On the other hand it appears that astrophysics is sometimes an outlet for energies frustrated by the almost insuperable difficulties which have developed in quantum field theory & meson theory).
- 2) Astronomy is also connected with ideological problems & here we may find a main source for the Soviet interest in this field. AMBARTSUMIAN referring to the I Conference on Problems of Cosmogony (16-19 April 1951) says p.330 of "The reports" of this Conference :- "One of the characteristics of Soviet Astronomy is that a high percentage of our work which is devoted to the investigation of various celestial bodies & systems has a cosmogonical trend. The idea of evolution, the idea of causality are very deep rooted with us. It cannot be otherwise since we firmly stand on the position of the method of materialist dialectics of MARX. In stellar astronomy this means that we attach great importance to, and spend much work on, such subjects which are turning points in their evolution." In an article in Priroda (Sept. 52) 8-18 on "The Problem of the Origin of Stars" he says (p.18):- "The importance of Cosmogony for a scientific materialist conception of the world is enormous. Therefore the struggle between the progressive & the reactionary outlooks is here more acute than in any other field of astronomy".
- 3) Cosmogonical theories are plentiful; of the more elaborate ones we may mention those of GAIKOV, HOYLE, JORDAN, LEMAITRE, v. WEIZSACKER. The Russians have not accepted any of these nor do they claim to have a fully developed theory of their own. O. Yu. SHMIDT has developed an ambitious theory of the origin of the planets. The official resolution of the I Conference on Cosmogony has much praise for SHMIDT's achievements & stresses his healthy line of thinking as compared with the idealistic errors of bourgeois astrophysicists such as LEMAITRE, MILNE, etc., but does not forget to mention the mistakes & gaps in his work (p.368). PARENAGO (Pr. Sept. 52) 125-128 in his review of M. IVANOVSKI 's "Birth of Worlds" 1951 states : "The Soviet cosmogonical theory, though fairly comprehensive & elaborate is far from being complete". AMBARTSUMIAN, who himself has done original work on stellar evolution which was well received by Western astronomers (cf. ROME Conference;) and O. STRUWE in "Science" writes in the preface to "Theoretical Astrophysics" 1952 that Western astrophysics is busy developing schematical models of internal structure far remote from reality. Soviet astrophysicists base their work on more real foundations.
- 4) One might conclude that the Soviets would like to boast of a theory of their own but are clever enough to see that they have not quite succeeded. Nobody seriously will claim that the various cosmogonic theories are more than interesting speculations which may contain elements of truth in details but are far from being solid extrapolations of knowledge.

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how often a sceptical attitude in-

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regard to many details. Geophysicists are especially interested in this discussion. As typical may be mentioned a recent paper by LEVIN in Doklady 91,3(21.7.53)471-74.

- 9) Whereas the I Conference(51) showed a certain official support for SHMIDT, no such bias in any direction is apparent in the available reports on the II Conference (1952). The multitude of the subjects would exclude this automatically; the reports seem to have been presented in a factual way. The most speculative part are the ideas of AMBARTSUMIAN on stellar associations & the formation of new stars; they are original and in their latest well elaborated formulations not unacceptable to Western Astrophysicists as the ROME meeting of the International Union of Astronomers has shown (cf. STRUWE....) AMBARTSUMIAN is certainly one of the leading astrophysicists not only in RUSSIA but in the world. Although his work concerns the (recent) formation of new stars, he does not speculate on Cosmogony proper i.e. in the Creation of the Universe, but on concrete problems arising from astronomical observations, such as the energy balance of hot giants & their connection with stellar associations (cf. his preface quoted in para 3.)
- 10) FESENKOV, partly together with ROZHKOVSKI, restricts himself to conclusions from observational evidence when he reports on the star formation from dense gas filaments which are themselves the result of turbulent processes in the gas dust medium; the filaments breaking up into chains of unstable globuli (such globuli were first observed by BOK at Harvard) connected by "lines" of thinly diffused matter, the remainders of mightier gaseous filaments. There is an interaction between stars & the generating matter - but quite different from HOYLE's "accretion" theories.
- 11) SHAIN is active on many subjects. He recently found some strange looking filaments of nebulosities; Doklady 85,1(1.7.52)52-59; he is especially interested in the connection of stars and gas or dust nebulosities; certain giant gas clouds seem to be connected with stars but not the first mentioned filaments. He has studied also the occurrence of Carbon isotopes in various types of stars (carbon 13 & carbon 12 stars have different rotational momentum) Interesting also are his ideas about the instable equilibrium of the atmosphere of supergiants & giants. He combines observations & theory; thorough investigation, sober analysis & wide knowledge.
- 12) Among the outstanding astrophysicists is a woman : MASEVICH. She has further developed into a definite theory the idea of "Corpuscular radiation" which had been developed by FESENKOV interpreting the main sequence of the HERTZSPRUNG-RUSSELL diagram as an evolutionary path. She has given an analysis of the internal structure of the hot giants which supports the ideas of AMBARTSUMIAN about their recent origin. A general idea of the work can be gained from her article in Priroda (Aug.50)9-15. She has since continued on similar lines.
- 13) The book "Theoretical Astrophysics 1952 (635 p.) by AMBARTSUMIAN, MUSTEL, SEVERNY, & SOBOLEV (including two paragraphs by S.PIKELNER) shows that Soviet Astrophysics generally speaking, proceeds on the same lines as in the West. Astronomy is a field where the Russians are much inclined to international cooperation & exchange. After all the sky is open to everybody who has the means, & the necessary mathematics & physics are well established there; it is the skill of their use, not so much the original invention which matters. There is problem of the quality of the instruments needed for observation & of favourable climatic conditions.

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- 14) Naturally the Russians cannot compete with American 200 inch telescope but they are developing special instruments for their special purposes (cf. STRUWE Science (27.3.53)315-18). MAKUTOV seems to well deserve the STALIN Pr. he got for the construction of mirror telescopes.

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One of this type of telescope installed at 1450 m. altitude near ALMA-ATA (constructed by JOANNISIAN) seems to be excellent in construction & installation & has enabled FESENKOV & ROZHKOWSKI to make interesting discoveries using special colour filters. The climatic conditions there are certainly excellent & there are other observatories under favourable conditions such as BIURAKAN on the foot hills of the ALAGEZ in ARMENIA. Special instruments have also been constructed for solar observation; the Crimean observatory using special polarization filters; interesting infra-red photos of the centre of the galaxy have also been taken there. Even less favoured old observatories such as PULKOVO are not forgotten (telescope 1.25 m/9 m.)

- 15) In addition to scientific articles in the Astronomical Journal, the Doklady, the Izvestia (Physics) & occasionally in the Vestnik, a few textbooks, some popular articles in Priroda & some popular books such as "How discoveries are made" 1952 by E. STROGOVA (giving biographical information) have been helpful in assessing the Russian position. The publications of the various observatories were unfortunately not available to us. However, the material we have seen gives sufficient reason to be impressed by the Soviet endeavours in a field which demands important investments in men & material at a time where one might have thought that other priorities were more pressing (cf. STRUWE). The ideological interest is important for the Soviets but the work is relatively sober & the remarks - mainly in popular articles - on "bourgeois" cosmogony are not quite without foundation. Reading some elaborately developed "theories" one likes to remember the "Song of Creation" of the Rig-Veda (X 129)

There was not non-existent nor existent.

.....

Whence this creation has its origin

Whether created, whether uncreated

He who looks down from heavens highest seat

He only knows - or does He know not either ?

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